FOOD INDUSTRIES

The Journal Devoted to the Problems of the Food Manufacturer

Volume 4.....Established 1928—McGraw-Hill Publishing Company, Inc.....Number 7

NEW YORK, JULY, 1932

•

Laurence V. Burton, Editor

Throwing Away Buying Power

AN ALL-WISE observer from afar would laugh at mankind today. Poor old humanity, toiling, fretting, grieving, worrying, dying; and to what purpose? All because ninety-nine per cent of us are always wrong in our judgments. Where man has gone before, experience has taught us that the majority is right; but where man has never been, the majority is always wrong, and all is vexation and vanity. Human foresight is forever a tragedy of errors.

● IF IT WERE otherwise there would be no poor. If it were otherwise there would be no debts, no foreclosures, no failures, no unhappiness, no want. For countless ages man has been taking chances, yet few have won the goal. Shall it go on forever? Will mankind never learn? Thousands of years ago the wise man wrote, "The principal thing is wisdom. Therefore, get wisdom; but with thy getting, get also understanding." Yet wisdom—the most valuable, the most priceless talent in the world—is still the rarest.

● A SORELY harassed world calls for leadership, yet would it need these leaders if the majority were not always wrong? False prophets arise, sincere though they believe themselves to be, and a horde of hopeless men set out on a hopeless quest for the bonus. Other false prophets arise and we have an Agricultural Marketing Act with its Federal Farm Board legally squandering millions of our money in a task that is utterly futile.

● WARS, booms, panics, staggering public debts, and continually increasing cost of government are ever the fault of the majority that is always wrong in its appraisal of the future. And that good old American custom of keeping up with the Joneses is but a trivial manifestation of the pathetic errors of man.

● THE Brazilian Coffee Valorization Plan, the Stephenson rubber restrictions, wheat pools, cotton pools, all are monuments to the folly of mankind. When relative prices fall, men first resort to every artificial bolster they can devise except the right one. Nothing but restricting production of things that people want will do it, and it is always the last to be tried. Agricultural prices fall, and mankind, ever wrong, keeps on producing to sell at a loss.

● MEASURED in terms of barter value, the products of agriculture bring less and less, while the products of urban industry are worth more and more in units of farm commodities. Only curtailment of agricultural production will restore general prosperity. Whatever price level obtains when that time shall have come will depend on general credit conditions. And until natural causes—weather, insects, plant diseases—shall have brought it about, the world will have to mark time. Man seldom applies the proper corrective measure voluntarily.

● NOT UNTIL the manufacturer will offer a pair of shoes for four bushels of wheat, instead of accepting a proffered fifteen bushels, can there be a restoration of that economic balance we call prosperity. Not until the clothier is forced to offer a fair suit of clothes for the price of one good hog, instead of three, will business come back. Not until dealers in low-priced automobiles are compelled to offer a new car for four thousand-pound steers, instead of ten, will there be much employment in Detroit. Not until the corn canner of the North will offer to exchange thirty cases of standard corn, instead of fifteen, for a bale of cotton, will economic parity be restored.

● AS LONG as agriculture gives away most of its own buying power it cannot purchase many of the products of industry.

Floors

Smooth floors, always desirable anywhere, are very important to the bakery where dough troughs are trundled about. Jolts produced by bumps or rough spots often burst the gas cells in dough. Several small bubbles may then flow together, making a large one, and be one of the many obscure causes of holes in the bread.

•

Opportunity Missed

United States Chamber of Commerce missed an opportunity to express itself on a fundamental problem. It should have declared for a national agricultural policy. Too much land is under cultivation. A well-executed policy of reduction of arable land and prohibitions against opening new lands to crop farming would ultimately do much to restore and maintain that needed agricultural buying power. Further exploitation of desert areas by irrigation projects should be stopped now. The commendable resolution proposing repeal of the Agricultural Marketing Act is only toying with a vital problem. The agricultural plank in the Republican platform likewise ignores common-sense fundamentals by indorsing the marketing act.

•

Flour Milestone

Man has ground wheat for thousands of years, but technical advances in flour manufacture are amazingly difficult. Flour has been studied in many a research department, but it has shown a singular resistance to inquisitive minds. A milestone is recorded here, both as an event in flour manufacture and as a justification for investment in research in lean years. General Mills, Inc., has announced its latest development, "Ferm-a-sured" flour, endowed with a long fermentation tolerance that will permit unusual latitude in the dough and proof rooms. Science is gaining rapidly in its long handicap race with ancient art.

•

Taxes

Consumers of food cannot escape the new federal taxes, despite all maneuvering. The tax on trucks, autos, tires, and lubricating oil brings it home to everybody. Soft drinks won't be ruined, but hard "likker" should rightfully carry this burden. Candy, already staggering, will feel it most. Chewing gum ought to carry its burden most easily. Much better and less lopsided would have been a manufacturers' sales tax. Watch costs for obscure indirect tax items that may torment you later, if overlooked now.

•

Help Wanted

If prohibition is repealed shall FOOD INDUSTRIES cover the production of beer and wine? Not that we need more work or subjects do we ask the question. Nor do we fear that brewing or vinification will languish then, any more than now. Brewing in particular involves control and perfect sanitary technique from which all food industries can learn. Beer and wine may displace other foods, yet stimulate consumption of still others. Should we plan to include these legally "extinct" industries if modification comes? Your advice is needed. It's your magazine. What do you want?

•

Father of Research

When George W. Cobb retired, on June 1, as general manager of sales of American Can Company, after fifty years' close association with the canning industry, the event merited recording. The high state of development of canning technology owes more to him than his modesty will ever permit him to acknowledge. Fundamental research by the National Canners' Association was his idea. Mr. Cobb is properly described as the father of research in canning.

•

Potential Business

June 17, 3 p.m.—The phone rings. Our Washington office is calling. The Senate Finance Committee is considering a plan to stimulate business. What amount of money will be required by all industry to replace obsolete equipment with profit-making equipment? *Capacity must not be increased.* Thus McGraw-Hill was asked to produce an estimate in less than three hours! FOOD INDUSTRIES prepares three independent analyses and estimates for its field

How shall it be checked? Surely the makers of equipment ought to know their potential business. Eleven are called. Only one has made a survey.

Our estimates of needed modernization for the food industries reached by different methods are $207,000,000; $90,000,000; $82,000,000. Conservatively, we report $80,000,000. For all industry, a little over $1,000,000,000.

•

Longer Life

Glass milk bottles, always a serious item of cost to a dairy, give greater service during a depression than in a boom period. Many firms normally average but ten to fifteen round trips per bottle. Last year the cost for new bottles to one large company was $4,500,000. A Mid-Western concern, which habitually has obtained twenty-five to twenty-eight round trips per bottle, is getting forty round trips in 1932 because it has almost no sales to industrial plants or construction jobs.

•

Opportunity

The Chamber of Commerce in a Georgia city offers the opportunity to enter food manufacturing with better than usual aid. Are you interested?

•

Bacterial Physiology

Someone in every plant, preferably the chemist or bacteriologist, should thoroughly understand bacterial physiology. Knowledge of its principles helps to avoid difficulties which arise through failure to understand the relationship of microorganisms to their chemical environment. Sometimes by simple means it is possible to modify the foodstuff so that spoilage is prevented or markedly reduced. It's simple if you know how.

•

Cheese Spreads

Most cheese spreads have a pH between 6.2 and 6.4, and do not keep well. The chemical environment is too close to neutrality to prevent spoilage. Templeton and Sommer, March *Journal of Dairy Science,* show how increasing the acidity to pH 5.9 to 6.05 by adding citric acid to cheddar cheese spread did not change its flavor but it doubled and tripled its keepability—a very practical example of the application of principles of bacterial physiology.

Cocoa-Milk Beverages Require Technical Control

By HERBERT B. LARNER
Glen Ridge, N. J.

Fig. 1—Result of a nine-day test at room temperature to determine effect of tapioca flour in middle bottle on settling of cocoa solids

DURING the past few years there has been considerable interest in bottled "chocolate" milk beverages, and numerous dairymen in many sections of the country have engaged in the business. Those companies that took the trouble to study the product, and then marketed it conservatively with proper regard to its limitations, have found it to be a profitable item. A number of these pioneers are still in the business. By far the greater number, however, plunged into the business without adequate knowledge of the product and its preparation, with disastrous results. The small minority, which had little or no trouble, recognized that they were dealing with a perishable product. These manufacturers made the best product they knew how, in a small volume which could be quickly sold, and distributed it through outlets which handled it with the care that must be given to any perishable dairy product.

In their early efforts to improve the keeping qualities of the product, some manufacturers used chemical preservatives which merely delayed, but did not prevent, spoilage. Eventually this practice was prohibited by health departments, but only after much good will had been lost in many sections. In spite of these mistakes, demand for the product at roadside stands and other outlets not easily accessible suggested a real need for some approved method of preservation that would enable "chocolate" milk beverages to be transported over considerable distances without refrigeration.

This problem was solved by subjecting the bottled beverage to the same heat treatment that the milk industry had been giving cans of evaporated milk for many years. Sterilization of "chocolate" milk naturally brought up minor technical problems, but in the main, they have been satisfactorily solved and today there are a number of low-priced "chocolate" beverages on the market which have a high sales volume.

An interesting development in the business has been the appearance on the market of sterilized "chocolate" and milk mixtures in which the cocoa solids remain suspended instead of settling to the bottom of the bottle. This is accomplished by increasing the viscosity of the product through the use of one of several thickening agents. The most common agent is tapioca flour, which, in addition to being edible, has the advantage of being cheap in price and easy to handle. Other substances, such as agar-agar, as well as various vegetable gums, may also be used, but tapioca starch is to be preferred. The proper quantity required to suspend the cocoa particles depends on the weight of the cocoa contained in the beverage as well as on the milk-solids content of the drink and can best be determined by experiment, starting with a small quantity of tapioca flour and increasing it gradually in successive trials until the right quantity is determined. The following examples will indicate the possible range of variation, dependent upon the milk-solids content of the beverage.

Formula I—1 gal. cocoa syrup, 10 gal. of skim milk with full solids, and 10 oz. of tapioca flour.

Formula II—1 gal. of cocoa syrup, 10 gal. of skim milk with half solids, and 14 oz. of tapioca flour.

It is to be noted in the second case that the tapioca flour has been increased 40 per cent to compensate for the 50-per cent reduction in milk solids. Whether natural fluid skim milk or skim milk powder and water are used is immaterial.

It is assumed that the cocoa syrup has the following composition and that users prefer a Dutch process cocoa to which is added small quantities of vanilla or other flavoring materials: 60 per cent sugar, 10 per cent cocoa powder, and 30 per cent water.

Tapioca flour is a pure white powder which mixes easily with cold water or milk. When subjected to heat in the presence of moisture, it swells and assumes a gelatinous consistency which materially increases the viscosity of the liquid and keeps the cocoa particles from settling. Furthermore, the fat globules from either the cocoa or the milk are likewise prevented from rising to form an objectionable ring of fat in the neck of the bottle. Only sufficient tapioca flour or other thickener should be used to accomplish the desired degree of suspension of the cocoa particles.

Tapioca may be used to produce either a non-settling pasteurized or sterilized "chocolate" milk beverage. It may be incorporated in the cocoa syrup or in a dry milk-cocoa powder mixture. Some operators prefer to add it separately to the mix, with the ad-

Fig. 2—Crowning wide-mouth bottles for cocoa-milk beverages which must be tight-sealed to permit agitation during pasteurization

Fig. 3—Perforated metal crates permit rapid circulation of heat medium during the pasteurizing process

vantage that it enables the operator to vary the quantity added, if necessary, and thus maintain a greater uniformity of viscosity.

Non-settling sterilized "chocolate" milk beverages are reputed to be of recent origin, but such is not the case, because the product has been known in Europe for many years. It is a matter of official record that in 1904 the French government granted a patent to Joseph Tanasier for his invention of a homogeneous "chocolate"-and-milk beverage which would keep sweet indefinitely in any climate and whose various components were so united that they remained in a homogeneous condition indefinitely. Tanasier described fully every feature of his process, including sterilization by heat and the use of tapioca starch. His description is so complete that it leaves no room for doubt that the credit of inventing the non-settling sterilized chocolate-and-milk beverage belongs to him.

The method of producing this type of drink today is exactly as Tanasier described in his patent. The first American patent covering this subject was granted to H. B. Hunter, of Norfolk, Va., in 1913. Where Tanasier confined his efforts specifically to a chocolate-and-milk beverage, Hunter worked with combinations of chocolate and many substances, including milk, in producing a sterilized beverage. Hunter also made and marketed a sterilized, non-settling chocolate milk beverage. Both the Tanasier patent and the Hunter patent have now expired and are available for public use.

The process of manufacturing the sterilized "chocolate" milk beverage is not a difficult one, yet those who first began to make the product commercially were beset with many annoying difficulties. Many of them that had to do with equipment have since been overcome. The matter of ingredients, however, has always caused trouble. Materials of good quality are essential. Many of the troubles were due to the attempts of manufacturers to use inferior raw materials, especially in the case of milk, whether the fluid or dry form was used.

The process of sterilization, subject to variations, involves heating the product to a temperature of 240 deg. F. for a period of 15 to 20 minutes. Actually the product inside the bottle is at that temperature for only a few minutes, but the additional time is necessary for the heat to penetrate the bottle. The process is a severe one and usually a low-grade milk powder will not stand up under such treatment. The same may be said of the use of fluid milk which is not strictly fresh or which has acquired additional acidity since production. The dairyman knows from experience the necessity of using only the best quality milk where the manufacturing process involves the use of sterilizing temperatures. Attempts to use anything but the best milk invariably lead to difficulties.

Numerous "chocolate" syrups are available for use in making either the pasteurized or sterilized "chocolate" milk beverages. It is more accurate, however, to refer to such products as cocoa syrups, because only a few, if any, of them contain any appreciable quantity of chocolate liquor. The presence of an excess of flavoring extracts or other substances which tend to alter the true chocolate flavor is to be avoided. Some successful manufacturers of "chocolate" beverages prefer to use cocoa in the powder form rather than in the form of syrup. This practice effects some definite economies and in addition enables the manufacturer to produce exactly the flavor he desires. Also, some manufacturers of cocoa powder have carried on considerable experimental work on "chocolate" milk beverages and are in a position to give to the dairyman or other prospective beverage manufacturer such valuable information regarding the production of a suitably flavored beverage. Refinements in the technology of cocoa powder manufacture have further aided in improving these beverages, and the large sales of "chocolate" drinks from the various retail outlets testify that the public esteem for such products is greater now than ever.

Laboratory tests involved in manufacturing the sterilized products are not complicated, but it is important that they be carried on systematically. Once a formula has been tested and found to be generally satisfactory, as evidenced by the sale of the product, there should be no deviation from it without good reason. The consuming public is quick to notice flavor changes in cocoa milks and, while there is frequent temptation to effect economies by substituting slightly cheaper ingredients, such changes usually prove expensive in the long run. All the ingredients used should be subjected to laboratory tests to insure their compliance with the standards set. Also the manufacturer of a non-settling "chocolate" beverage will need to exercise particular care in testing the viscosity of each batch, because excessive viscosity is objectionable to the consumer. Samples from

each batch should be suitably marked for identification and retained to check the manufacturing process.

Experience has proved that the rotary type of sterilizer is superior to the stationary type, because the tapioca flour or other thickener must be agitated during the heating process. The proper use of the sterilizer is so important that it should be surrounded by every possible safeguard. A single batch improperly sterilized can do great damage to good will, once it is placed on sale in the retail outlets. For this reason each thermometer or pressure gage on the sterilizer should be checked for accuracy and the operator should be required always to keep a record of time period and temperatures even if they are automatically controlled. In any event it should be equipped with an accurate recording thermometer as a final operating check.

The importance of sanitation in the milk plant is too well appreciated by the experienced dairyman to require much comment. It is a fact, however, that many of the difficulties experienced by manufacturers of "chocolate" milk beverages have been due to their failure to maintain the necessary scrupulous sanitary conditions. When the product is packed in milk bottles involving the use of milk equipment, sanitary conditions are easily maintained. Where it is made in beverage bottles, however, and the ordinary type of filling equipment is used, the cleaning of such equipment must be done with great care. Soda water bottlers using the same filler to make both carbonated beverages and sterilized milk beverages will need to be extremely careful in the cleaning of their fillers. A very small amount of carbon dioxide gas in a filling machine on which "chocolate" milk has been bottled, will cause the entire batch to coagulate or curdle when it is subjected to the heat of sterilization, and, of course, the converse risk of contaminating the carbonated beverages also exists.

It should hardly be necessary, particularly in these times of economic stress, to suggest that the manufacturer know accurately his manufacturing costs. Yet it is a fact that many milk and beverage companies operating "chocolate" milk units as an adjunct to their regular business, have no accurate knowledge as to whether the "chocolate" unit is a profit maker or is being carried by the rest of the business.

Manufacturers of these beverages, like all manufacturers of food products, eventually find themselves in contact with individuals from the various agencies of the government charged with the duty of enforcing food or health regulations. Up to the present, the supervision directed at "chocolate" milk manufacture has been rather casual in many sections. However, it is only a matter of time when the activities of these agencies will be increased. In the meantime the forward looking manufacturer of beverages will take advantage of the opportunity to study the regulations pertaining to his business and will make sure that these regulations are being fully complied with.

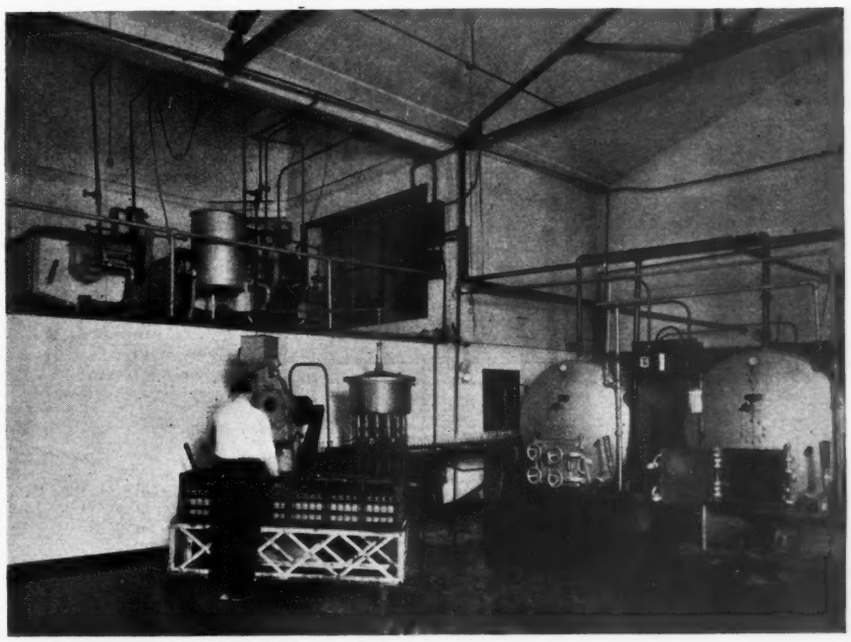
Merchandising of "chocolate" drinks presents all of the usual market problems plus some new ones. The man who is about to engage in the business will do well to study the matter first from the marketing angle, rather than plunge into the manufacture of the product and then wonder where and how he will sell it. This is not an idle warning; such a short-sighted procedure has been followed. There are sections of the country where bottled "chocolate" beverages sell very well and show an excellent repeat value.

The prospective manufacturer should study his market very carefully and should have reasonable evidence that the demand exists or can be created. He should study competitive products from the viewpoint of quality, price, shape and size of package, as well as advertising done, and should make sure that his product has points of superiority that will be recognized by the consuming public. Appearance of the package is a most important matter, yet if we are to judge from the looks of many products offered for sale, it was the last thing taken into consideration.

Rural sections usually offer better markets for this product than the large cities. Milk companies making a pasteurized product will find schools, factories, and local centers of recreation, which can receive frequent service, to be principal outlets. The sterilized product with its better keeping qualities can be shipped much greater distances and is particularly suited for distribution through roadside stands and outlets that are less accessible or have limited refrigerating facilities. The manufacturer of carbonated beverages is in an excellent position to distribute "chocolate" beverages to these outlets along with his other products. Many carbonated beverage manufacturers, although recognizing that there is a demand for "chocolate" milk, are reluctant to make the product. They feel that the product should be made in a milk plant. A satisfactory solution of this problem is for the milk company to manufacture the drink and arrange for bottlers and beverage jobbers to distribute it. This arrangement has proved to be a satisfactory one in many cases and in some sections confectionery jobbers have proved to be excellent distributors.

The use of the milk company's name is of considerable value in marketing the beverage, as it creates in the public mind a feeling of confidence that the quality of the product is all that it should be. The manufacture of bottled "chocolate" milk beverages, whether pasteurized or sterilized, seems logically to belong to the milk industry. This is not to say that every milk company can engage in the business to advantage, but in some sections there are certain concerns that can handle it with profit. In any case, the company wishing to engage in the business will do well to go at it in a conservative way. This is particularly desirable in the case of sterilized products, where a considerable investment in bottles, cases, and machinery is required. The manufacturer will be wise if he handles the product in his own bottles and under his own trade name so that all advertising done and good will developed will react to his company's exclusive benefit.

Fig. 4—Processing cocoa-milk in a compact, fully modern manufacturing unit



Oven Heating Characterizes Baking Industry

[PART II]

By HARVEY O. MERCIER
Engineer in Charge of Development
National Biscuit Co.
New York, N. Y.

IN THE traveling tray oven, as in the reel type, the product is conveyed through the baking chamber on shelves (referred to as trays in this type of oven) which are free to swing on their supports. And, as in the reel oven, the trays move past the oven mouth in a vertical plane for loading and unloading. A general arrangement is shown in Fig. 1. This type of oven is used most for baking bread, with the chain conveyor system carrying the trays in a series of vertical and horizontal paths, thereby providing large capacity with minimum floor space. Such ovens are generally built in sizes to bake approximately 2,500 one-pound loaves of bread per hour. The bread usually is of the panned type and the pans are placed on and removed from the trays by hand. In some cases hearths are provided on the trays, upon which rye and other hearth breads are baked. They can be used also for coffee cake, rolls and the like.

The usual practice is to fire directly and use gas as fuel, although recent developments provide for indirect firing with unit fireboxes and forced circulation of heat through radiator tubes and ducts properly placed in the baking chamber for the best distribution of this heat. The construction is generally of the built-up sheet-steel shell over a fabricated steel frame, the low heat capacity of which facilitates bringing the oven quickly up to the baking temperature. These ovens are well designed and fill a particular need for the average medium-size bakery.

For general baking purposes the tunnel type of oven is in wide use and has undergone considerable refinement in its gradual improvement, and at the present time is still being subjected to intensive study for the purpose of yet broader application. A general arrangement of the tunnel-type oven is illustrated in Fig. 2. There are many variations in design but it always embodies the essential principle that a conveyor system carries the product through the baking chamber on one level and in one continuous direction; furthermore, the loading is done at one end and the unloading at the opposite end. It is adaptable to the baking of nearly all kinds of bakery products. Its chief use, however, is for such products as bread, sweet biscuit, rolls and soft cake, although some success has been achieved in baking sponge crackers.

This oven is made in sizes varying from 6 to 16 ft. in width and from 50 to 150 ft. in length. The conveyor system for bread baking consists of sprockets mounted in position to support and guide two chains one on each side of the oven. To these chains are fitted special attachments connecting with steel plates arranged to provide a smooth, continuous baking surface. Joints between the plates are carefully fitted to prevent an excessive flow of heat between them, which would in turn cause a dark or "burned" mark on the hearth-baked product. Ordinarily the pans are placed on these plates by hand, although in some cases mechanical means of feeding are employed, but at the delivery end the pans are removed and emptied manually. Hearth bread can be baked directly on the plates and is, of course, hand loaded. This type of bread, however, lends itself to automatic conveying away from the oven without hand labor. In the case of some types of sponge crackers, the dough is peeled on the plates in much the same manner as hearth bread and also is unloaded by hand.

When used for baking sweet biscuit, the conveyor system consists of sets of chains for carrying the solid or open wire pans—whichever are used. Usually there are four sets of two chains each and the pans are placed on the chains lengthwise. Both the loading and unloading of these pans is a semi-automatic operation. Considerable success has attended the use of this type of oven, equipped with a steel band conveyor, used singly or in multiple, for baking sweet biscuit and crackers. The simplicity and relatively low first cost for this design is attractive, but future widespread adoption depends upon favorable results from more extensive experience than is available at present.

Temperature control is easily attained in the tunnel type of oven. A brief study of Fig. 2, particularly the burner arrangement, will show that the baking process can start at one temperature and undergo several temperature changes, as found desirable, before the process is completed. This control of temperature is a distinct advantage over the reel type of oven and makes possible the production of goods of much higher quality and of quite different character than is possible with the reel type. Another important advantage over the reel oven is the almost complete elimination of excessive browning which occurs on the product near the edges of the shelf or plates.

Many tunnel-type ovens that have been built and put into operation are made entirely of brick. Until recent years a strong conviction has existed in the baking industry that brick construction is essential to the baking of a high-quality product. The present practice is, largely, to build these ovens

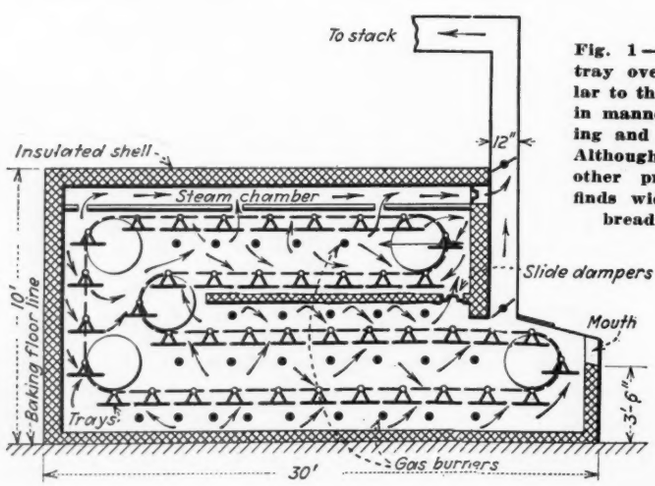


Fig. 1 — Traveling tray oven is similar to the reel type in manner of loading and unloading. Although used for other products, it finds wider use in bread baking

of fabricated iron and sheet-steel shell construction, insulating them with magnesia blocks, rock wool and similar materials. The advantages of light weight, ready response to changes in the rate of fuel combustion and low radiation losses commend this type of construction.

Both direct and indirect methods of firing are used. The brick oven is readily adaptable to the indirect flue system, with which oil, gas, or solid fuels can be used. Oil can be used also with the steel-shell type when it is burned in unit furnaces and when the heat is distributed through ducts and tubular radiator systems or through a system of hermetically sealed steam pipes properly arranged for efficient circulation of heat in the baking chamber. Gas is the most generally used fuel and is burned either as an open flame in the baking chamber with a correct baffle arrangement or in a series of individual tubes which radiate the heat to the product while the products of combustion are exhausted to the atmosphere without coming into contact with the product. Electricity also is used for direct heating where economically justified.

The cost of this type of oven is higher than any type yet discussed, but its ease of control, high capacity, flexibility and adaptability to mechanical loading and unloading makes it indispensable to large-scale production.

The tier type of oven, shown in Fig. 3, is the latest achievement of the oven builder's art and represents a great forward stride in automatic baking. This oven is at present principally used for baking biscuits and crackers. Its conveyor system is a highly elaborated development of that used in the tunnel type of oven. It consists of a pair of endless chains guided and controlled by sprockets arranged in a manner to carry the baking pans and the product through a series of horizontal paths in the baking chamber. They then pass through a cooling section and finally to a convenient location for packing, where the product is automatically unloaded. From this point the empty pans are returned through a preheating chamber, which is often a part of the oven, to the panning or cutting machine, where they are loaded and again enter the oven to repeat the cycle. The travel of the chain is uninterrupted, and all the operations of baking, cooling, delivering to packing table, returning to preheating chamber, as well as passage through the cutting machine and loading, are done while the conveyor system is in continuous motion.

To make possible the automatic loading of the pans and to conserve space, the baking pans are not freely suspended as in the reel and tray types of oven. Each is supported by a light metal framework, which in turn is connected by means of special attachments to the chains of the conveyor system. Special means are provided to maintain the pans in a horizontal position while they are being loaded and as long as they carry the baked product. The flexibility of this design permits the easy arrangement of the number and lengths of tiers of pans to fit the available floor areas and ceiling heights.

Both direct and indirect methods of firing are utilized to heat these ovens and gas is the fuel used. Each tier is separately baffled to obtain perfect control of temperature conditions in the various sections. All the advantages of good heat control in the tunnel type of oven are available here. Further developments undoubtedly will bring into operation systems of fuel burning and heat application which will be considerably better than those now in use.

The capacity of these ovens is considerably higher than that of other types and the total heat load is correspondingly higher, ranging up to 5,000,000 B.t.u. per hour for large units. The width of the baking pans is approximately 3 ft. To obtain the required baking area the oven must necessarily have a baking chamber considerably longer than that found in other types. However, this oven is adaptable to building conditions. Floor space requirements for any desired length of baking chamber may be met by increasing the number of tiers used up to the limit set by ceiling clearance. And, *vice versa*, a low-height oven unit of given productive capacity may be designed by increasing the over-all length of the oven and reducing the number of tiers. The type of construction assists in this flexible feature, as it is of the built-up sheet-steel-shell design. Because of the more intricate mechanical arrangement of this type, the initial cost is higher than for other types, but this added cost is justified by its higher capacity, automatic loading and unloading, and greater efficiency.

The tremendous volume of bakery products required to satisfy present consumption is manufactured largely with ovens of the five types that have been discussed. Constant attention on the part of bakery engineers is being given to the problem of further perfecting the mechanical equipment used for heat application in the baking industry and considerable improvement undoubtedly will be achieved within the next few years.

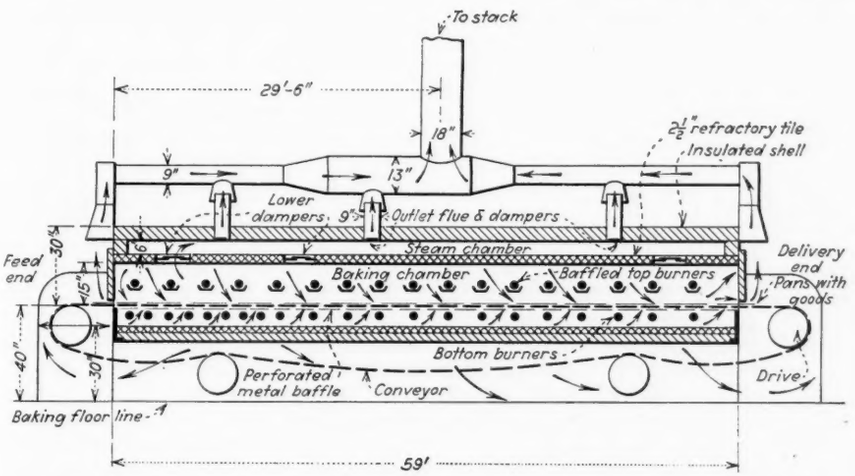
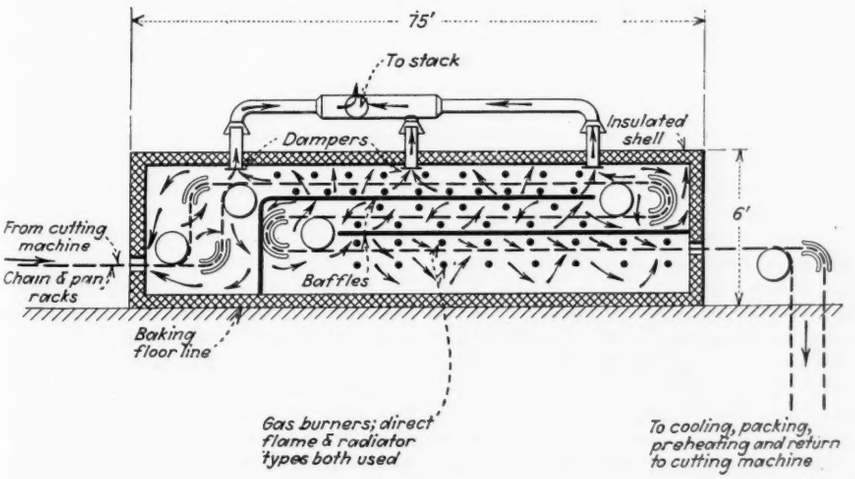


Fig. 2—Flexibility in operation permits tunnel ovens to be used for nearly all kinds of baking. Burner arrangement gives controlled zone-heating

Fig. 3—Automatic baking of biscuits and crackers has been advanced by the tier oven, which is better known in Europe than in America



General Foods

Edible Nut Industry Grows Up

By EDWARD J. NORTON
Director Bevan Sociedad Anónima
Malaga, Spain

NUTS are among the oldest and best known of food products. But for many years they were consumed only in their natural state and the demand for them grew very slowly. Their cultivation was limited to tillable land not needed for other purposes or to waste land suitable for reforestation. Now, however, nuts are prepared in a great variety of appetizing ways and their byproducts have assumed such great importance that the world's production has increased enormously in recent years and many thousands of people in many countries are engaged in the edible nut industry.

Dietitians are constantly recommending nuts for increased use as articles of food; and quite correctly. Most nuts are high in nutritive value and rich in oil, protein, iron and vitamins. They make an ideal dessert for any meal. There is no better substitute for meat. A pound of pecan meats, for example, is reputed to contain as much nutritive value as 2 lb. of pork chops, 3 lb. of salmon, or 5 lb. of veal. Peanuts, likewise, are one of the cheapest and one of the best food products. So are almonds—undoubtedly one of the most valuable forms of protein foods. If shelled almonds are roasted in a pan in an oven a flavor is developed that is very agreeable to the taste. This food may be used with any meal to which toasted bread is ordinarily added. Intelligence in our changing food habits is the main factor which has brought about such a steady increase in the consumption of edible nuts.

Complete statistics of the trade in edible nuts are unobtainable. However, the annual farm value of nut crops in the United States will average approximately $50,000,000; and the annual imports (excluding copra and coconut products), about $20,000,000. Add to these amounts the annual imports into the United Kingdom and Canada and the grand total will be over $100,000,000—in three countries only. Then there are the auxiliary industries which process or utilize edible nuts in different forms: the confectioners, bakers, ice-cream manufacturers, and manufacturers of nut-food products, with an invested capital in the United States alone of about $300,000,000. Thus it is possible to visualize the magnitude of the great and growing business which constitutes one of the major divisions of food industries.

One notable feature of the trade in edible nuts is that, of all food products, nuts enjoy almost a ready-made market. Probably no other large industry, at least in foodstuffs, discloses such a large and growing volume of business with such limited sales effort. There is not much advertising of edible nuts; certainly there is none in Europe. In the United States, until quite recently, the only advertising which has been done is that of the California Walnut and Almond Growers' and some of the peanut and pecan associations. In many ways, the nut industry is a phenomenon, a marvel, a prodigy, among the world's great trades. Even with those whose attention is directed to the study of food production and distribution there seems to be a lack of appreciation of the importance of the trade in edible nuts. An attempt to summarize the industry may be of interest.

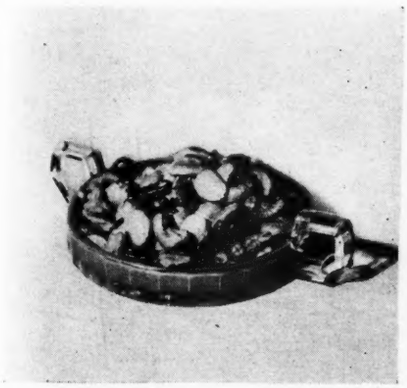
The place of distinction in the nut dish belongs unquestionably to the once lowly and humble "goober." But a question arises. Is the peanut a nut? It is not. The dictionary confirms the statement. A true nut is a fruit consisting of a kernel or seed inclosed in a woody shell. Or, to make this simple explanation less intelligible, a nut is a hard indehiscent, one-seeded fruit with a woody pericarp that does not open when ripe. Furthermore, in an effort to exclude the peanut from relationship with the real nuts, the latter grow on trees or bushes. And finally, most nuts may be eaten in their natural state. All the evidence therefore is against the peanut, because botanically and horticulturally the peanut is merely the fruit of a trailing plant of the bean family growing and ripening under ground. By most people, the peanut is not enjoyed in its natural state; it must be roasted. Therefore, believe it or not (page Mr. Ripley), the peanut is not a nut; one more traditional sentiment is shattered. Nevertheless, being a friend of all the world, the peanut is everywhere loved.

In the days of unrestricted immigration the peanut came to the United States—in the steerage—from Brazil. And, like many immigrants, the peanut developed in obscurity. Eventually, it became the delight of the American small boy, who always knows a good thing when he eats it; and some one-time small boys may yet remember the street corner peanut vender with his whistling heater—the chief distributing method of those good old days. Then, when the grown-ups also took to peanuts, the peanut traveled with the circus. It traveled on trains with the candy butcher; and it traveled everywhere, becoming a very essential commodity at baseball games. Today, the peanut in some form is on most tables or desks, or in most pockets, at breakfast, luncheon, tea or dinner.

The peanut industry has made good. It has even attracted the attention of the Department of Justice, which, some years ago, charged one of the growers' associations with operations in violation of the Sherman Anti-Trust Act. When one thinks of the meek peanut developing into an allegedly pernicious trust there is no telling what the future may hold for spinach.

Old-fashioned folk like their peanuts —as they do oysters—on the half shell. But tons of peanuts are consumed in blanched and salted forms; more tons are ground into peanut butter; other tons into peanut meal for macaroons and for confections; and they are combined with chocolate and syrup for the manufacture of peanut bars. Over a hundred recipes for preparing peanuts for food have been worked out, including soups, bread, cakes, cookies, salads; and as substitutes for meat dishes. Practically no portion of the peanut goes to waste. By some people peanut oil is considered to be as good as olive oil; and the manufacture of peanut oil is an important branch of the oil industry. A good part of the peanut shells are profitably utilized. Some genius has discovered over one hundred and thirty-four different products which may be made (not, however, profitably as yet) from the shells and residue of the peanut.

In 1931, twelve states produced 541,555 tons of peanuts. But the peanut farmers of America did not grow enough



goobers. In that year 4,236 tons more were imported from China. Some other countries, notably the Dutch East Indies, send peanuts to the United States.

Shall we, therefore, deny the place of honor to the peanut? We cannot. For the one-time lean, feeble and poor peanut—the black sheep of the bean family —has become fat, rich and strong. It is estimated that there is invested more than $125,000,000 in the peanut industry, which gives direct employment to 150,000 people, and that upward of 2,000,000 acres of land in the Southern States is devoted to the cultivation of peanuts. Because of boll weevil and the decline in the price of cotton, the peanut today is one of the chief "money crops" in the South; second only to tobacco.

Taking leave of the mighty little peanut, a salute should be rendered to the royal almond, the Nut of Nuts; and to the celebrated "Jordan," the "King of Almonds," which is exclusively a product of Andalusia, Spain.

As this is written, the valleys and hillsides of southern Spain are adorned by the pinkish white blossoms of the almond trees. The contrast with the deep green foliage of the orange groves and the lighter shade of interminable rows of olives forms a beautiful feature of the landscape.

For the benefit of those to whom noble or worthy nut lineage appeals it may be said that while peanuts (or any other nut) are unmentioned in the Bible, the almond enjoys that privilege. The rod of Aaron (Numbers XVII, 8), was taken from an almond tree. The Jews carry rods of almond blossoms to their synagogues on great festival days; and almonds are still in large demand among the Hebrews, with whom it has long been a custom to make almond cakes for their religious holidays.

Originally a native of Asia, the almond is now extensively cultivated throughout the countries bordering the Mediterranean. Its cultivation has extended to California, where approximately $50,000,000 is invested in almond orchards; where 14,800 tons of almonds were produced in 1931, having a farm value of about $2,605,000. However, due to some influences of soil or climate, the almond in California has not attained the perfection which characterizes its Mediterranean ancestors. Generally speaking, the California almonds are of a fibrous nature and they lack the flavor of the foreign-grown nuts. Furthermore, the confectioners, chocolate-bar manufacturers, almond-paste manufacturers, blanchers, salters, and other nut-processing industries of the United States require a wide variety of almonds to meet their peculiar needs. These cannot be produced in California. Therefore, the imports from abroad of shelled almonds amounted in 1931 to more than 13,000,000 lb., valued at $2,883,420.

From Spain come the Jordan and Valencia types; and almonds are grown in Majorca and the Canary Islands. The latter are used chiefly in the manufacture of bonbons, for chocolate coating, and for almond bars. The largest sizes are blanched, salted or roasted. The almonds of France, grown near Aix, are somewhat similar to the Spanish product of Valencia.

Italy produces the greatest variety of almonds. The best known are the Avolas, flat and thin-skinned and easily blanched; the Aetnas, which are suitable for chocolate coating; the Palma and Girgentis, used in the manufacture of almond bars; and the very sweet almonds of Sorrento. The 160-mile-long Island of Crete also sends almonds, grown from century-old trees, to the United States.

How the elongated and best flavored of all almonds came to be known as "Jordans" (exclusively a Spanish product, and there called "Jordana") is one of the mysteries of commercial nomenclature. But for a century or more these splendid almonds, which can be successfully grown only in the provinces of Malaga, Almeria and Granada, have been known as Jordans. No nut, not excluding the cosmopolitan peanut, goes to so many and such distant parts of the world.

Jordan almonds are used chiefly as a dessert and are especially appreciated when eaten with the delicious Muscatel raisins of the province of Malaga. They are also blanched and salted, and are used by manufacturers for "sugar-coated Jordan almonds." A special distinction of Jordans is that these almonds are all sweet. In nearly every other variety, wherever grown, bitter almonds are present. These must be carefully taken out, as their presence in confectionery, for example, would impair the value of the product.

Salted almonds, especially of the Valencia type, have been sold for some years, but their sale, until recently, has been limited—probably because of the high retail prices charged for them. Now that salted almonds are cheaper, their consumption has rapidly increased. One of the best known and oldest uses of almonds in the confectionery and baking trades is the preparation of almond paste. It is estimated that from six to seven million pounds of almond paste is consumed annually in the United States; much more in England. Almond butter and almond powder are the newer products which have found favor with consumers, because of the ease attending their use by the housewife.

Almonds probably require more processing than most nut products. After the cracking of the extremely hard shell, which must be done with great care to avoid marring the tender nut meats, the selecting operations commence. Jordans, for example, are graded into eight standard sizes (also into special selections to meet certain specific manufacturing requirements), the smallest nuts counting 36-40 kernels to the ounce and the giants of the crop producing only 12-13 to the ounce. The Valencia types are similarly selected, ranging from the small ones, which count 40-44 to the ounce, to the largest, which yield 14-15 to the ounce. Some machines are used in the selecting processes to take out the dust

and broken nut meats, but most of the work is done by hand. In several of the largest exporting establishments of Malaga and Alicante, thousands of women operatives work with incredible speed and accuracy in the grading of almonds.

In the United States, walnuts hold second place in respect to greatest increase in consumption. California produced 28,000 tons of walnuts in 1931, but its crop was insufficient to meet the demands of the American consumer, and an additional 11,000 tons was supplied by purchases from France, Italy, Turkey, Manchuria and other foreign countries.

Under favorable climatic conditions, walnut trees become the giants of the nut orchard and are very long-lived. But, more than any other nut-bearing tree, the walnut is susceptible to attack by various insect pests and it requires much more care and attention than, for example, the almond or the filbert. Even when the greatest precautions are taken, most orchards produce a large proportion of misshapen, stained or wormy nuts, and discolored and dark meats.

For flavor, the Grenoble varieties known as "Mayettes," or "Chaberts," from the Isère Valley, in France, with kernels that look as if they had been dipped into rich cream, surpass all others. Next come the Corne, also produced in France, which have a bright, golden-colored shell and are like the Spanish walnuts grown in Catalonia. The Manchurians sometimes are very good; often very bad, due to their exceedingly oily nature; also they do not keep well. Another popular variety is the fine-appearing and richly flavored Italian walnut, which is grown on the high, flower-embowered peninsula of Sorrento. The South American walnuts, from Chile, are now a staple product in the United States.

The village blacksmith and the chestnut tree under which he set his forge have practically disappeared. Most magnificent of all nut-bearing trees was the chestnut. Highly desirable for its light and durable wood, but unfortunately attacked by "blight" in most sections of the United States, these noble trees no longer delight the eye of the lover of nature. In Europe, however, the chestnut flourishes and attains a great size.

About 10,000 tons of chestnuts are imported into the United States annually from France, Italy and Spain. Dried chestnuts are very palatable, but most people prefer them roasted, baked or boiled. Some housewives still prepare chestnut dressing for their Thanksgiving and Christmas turkeys or grind the chestnuts into meal for bread or cake. Considering the growth of the demand for chestnuts, the cultivation of this splendid tree may again become an important industry in the United States.

Years ago, "Charley's Aunt" was a very popular comedy. Perhaps now, only grandfathers can remember it. But the popularity of Brazil nuts has not diminished. About $2,000,000 worth are imported annually into the United States, where they are known as "cream" or "Para" nuts—the latter name being derived from the port of Para, from whence large quantities of the nuts were formerly exported. The small boy in the United States, by instinct a nut eater, knows Brazils as "niggertoes," and reaches for them with avidity. Brazils are delicious table nuts, and most of them are consumed as a dessert. In a lesser degree than most other nut meats they are used in confections.

The Brazil nut is grown in the tropical belt of northern Brazil and French and British Guiana, and along the mighty Amazon and its many tributaries, great and small. The triangular seeds which we know as Brazil nuts are borne by colossal trees in immense dim forests and are taken from a pod, or heavily armored shell, about six inches in diameter which contains from ten to fifteen or more nut meats of different sizes, each also incased in a horny, bark-like covering. These shells are Nature's cold-storage and positive preserving protection for her susceptible products. Nothing in the world is so effective for the purpose.

Year after year, the United States buys from Italy, Spain and Turkey from about $1,250,000 to $2,000,000 worth of filberts which are utilized chiefly by manufacturing confectioners, bakers, and in the manufacture of chocolate bars. Commercially, the Sicilians are the best; next are the "Long Naples"; then the "Round Naples." Almost equally popular are the filberts from Tarragona, Spain; called Barcelona nuts in England.

In the United States the filbert was, and probably is, known as the hazelnut (don't you remember the green outcovering and the smooth thin shell inside?). When some of us were young and lived in the Eastern and Central States we had nut-collecting parties in the autumn to collect hazelnuts for the winter evenings. The hazelnut grew wild then. Now the production of the cultivated filbert is slowly becoming an important addition to the nut crop of the United States.

The old-fashioned hickory nut, of the walnut family, is disappearing. In its place, we have the delicious pecan—an offshoot of the hickory, with olive-shaped, thin shells. In the United States, the pecan industry has assumed considerable importance. In Chicago alone there are said to be sixteen shellers shipping to fourteen states and giving employment to 2,000 people. The cultivation of the trees is growing throughout Georgia, Oklahoma, Florida, Alabama, Louisiana, Mississippi and Texas. Pecans grow in 37 of the 48 states; a commercial crop is produced in eleven southern states with a 1931 production of 37,367 tons. A small quantity of inferior pecans are grown in Mexico, Europe and Asia. Their importation into the United States consequently is limited, having a value in some years of $50,000.

Pecans are a rather uncertain crop. Trees which will bear heavily one season may have few or no nuts the following year. Scientific methods of cultivation are overcoming this difficulty. Pecans are used in the preparation of confections, dessert dishes, cakes, bread and salads. Several pecan-growing associations have published books of tested recipes for serving these delightfully flavored and healthful nuts.

A comparative yet very welcome stranger to the nut trade in the United States is the crescent- or kidney-shaped cashew nut—excellent either raw or

Jordan and Valencia almonds are graded by hand in plant of Bevan S.A.

roasted—which comes chiefly from British India, although some cashews are imported from the West Indies. The cashew is one of the most perishable of nut products, but, by improved methods of packing, it now withstands long voyages and is rapidly becoming one of the most popular of the new nut foods. Out of small experimental shipments, the imports of cashews into the United States have grown enormously, because, as statistics disclose, American purchases of these nuts in 1931 were over 10,524,000 lb., with a value of nearly $2,100,000. The cashew yields a caustic oil which is sometimes used as a marking ink. The negroes of the West Indies have a firm faith in the virtues of this oil as a remedy for warts and corns. It's worth trying.

The list of edible nuts is so long that in describing them and their multiple uses one hardly knows where to stop. Some forty-five different countries send their nut products to the United States and to other markets, so this article must be limited to the best known of many excellent nut products. Thus, greatly loved by the Arabs and often mentioned in "The Thousand and One Nights," there is the pistachio, or "green almond," which comes to the United States, as it did in the beginning, from Syria, the carefully irrigated gardens near Damascus, and some other Mediterranean countries. Pistachios are used in confections. For a dessert they are best when roasted and salted. In 1931, as much as 1,494,000 lb. of these dainty nuts were imported into the United States.

The pignolia, or "pine nut," with its delicate flavor, should be better known in America. The "pili," not of the Philippines, triangular in shape—much shell and little meat—will, in years to come, grow in popularity, for it is good either raw or roasted. The paradise nut—known also as the Sapucaia—with its corrugated shell, is a unique product among nut foods because of its flavor and the limited quantity which is collected annually along the Amazon.

No story about nuts would be complete unless the coconut was mentioned. For the coconut is not only edible but is drinkable. Coconuts, as food and drink, form the principal article of food for millions of people in many tropical countries. No one knows were coconuts go or how they are consumed. There is a mystery about them, because over 59,000,000 coconuts were imported into the United States in 1931. Who devoured them? The darkies of the Southern States manfully did their part; but they possibly could not account for 59,000,000 coconuts! In addition, the United States purchased from the countries bordering the Caribbean Sea and from the islands of the Pacific, about 250,000 tons of broken, desiccated or prepared coconut, and copra. Every housewife knows the uses of shredded or desiccated coconut. Besides, copra is used in the manufacture of coconut oil for soaps, toilet preparations, candles; as a filling for confections, wafers, biscuits or crackers.

In its natural state, the "milk" of the coconut is most refreshing. But man, improving—as he sometimes does—upon Nature's works, invented the "coconut swizzle," admirably designed to offset the spell of the tropics and the wearing, enervating effects of a tropical climate. So, years ago—perhaps not now, because drink habits change as food habits do—the swizzle made glad many a masculine heart. Among the exiles of the tropics it was a soul saver. And most of those who lived in the countries where coconuts grew succumbed to the allures of a well-concocted coconut swizzle and invoked blessings upon the inventor thereof. It was made thus: a choice, ripe coconut just taken from a tree. A dark boy wielding a sharp machete sliced off the top of the nut. Into the cool clear "milk," another dark lad dropped some cracked ice (if there was any ice!); then, someone (who cares who?) added four fingers—a generous measure—of Plymouth or "Old Tom" gin.

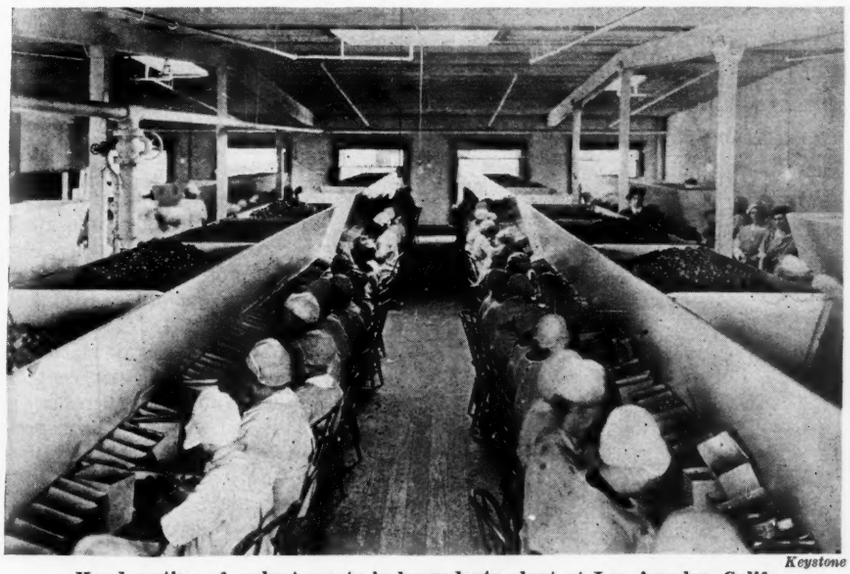
As there was "never yet philosopher who could endure the toothache patiently," never, to the knowledge of men, was there a thirsty soul who awaited passively the presentation of his swizzle. But when the boy came down the veranda with his great tray of coconuts—straws emerging from the top of each—there was a period of peace, quiet, calm and tranquillity. Men in a row of chairs each hugged to his manly chest a coconut swizzle—the drink of drinks—and all was right with the world!

With the development of civilization, native wild nuts in the United States are fast disappearing. The great chestnut trees which once were so abundant in a wide area of the Eastern, Middle, and Southern States, are nearly gone. One of the finest and sweetest of all American native nuts is, or was, the hickory. But not many are seen nowadays. The black walnut and the butternut are gone; most of them. Yet, the cultivation of these excellent native nuts may in time become an important addition to the nut industry of the country.

In these days of pessimism and arrested prosperity, it is encouraging to look backward and observe how slightly the severe and far-reaching period of business depression in 1930 and 1931 disturbed the edible nut industry. Not shockproof, of course, it is a fact, however, that the general trade in edible nuts suffered less than most important divisions of food industries. This despite the fact that the last two years' nut crops, taken by and large, were heavier than in most seasons past.

In 1931, the combined crops of pecans, peanuts, walnuts and almonds in the United States were very large. Spain, also, produced the heaviest crop of almonds known in many years; the almond crops of Portugal and Morocco were large. The yield of filberts in Spain, Italy and Turkey exceeded the outturn of 1930. Foreign-grown walnuts were in greater supply in 1931 than in 1930. Italy was the only important almond-growing country to produce less than an average crop.

The latest market reports contain assurance of practically a complete sell-out of nearly all kinds of nuts well in advance of the coming season's crop. Fluctuations in foreign exchange brought about some variation in selling prices, but, on the whole, the basic value of nut crops has been well sustained. In the United States the only nut products which sagged temporarily were pecans and peanuts.



Keystone

Hand sorting of walnut meats in byproducts plant at Los Angeles, Calif.

"Baby" Fumigators Enable Turks To Rid Figs of Insects

By HARRY STINER
Pest Control Department
National Biscuit Co.

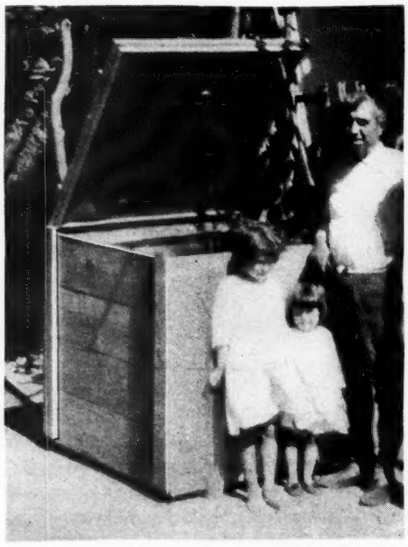
Putting fumigation on an efficient commercial basis in a country where religious teaching was against the destruction of insects; where the whole process was strange and mystifying to the natives; where there were no scientifically minded workers, and where the nature of the product and the methods of handling it rendered certain of the fumigating processes ineffective, was by no means a simple task. Yet, it was done. In this article, Mr. Stiner describes the trials, tribulations and triumphs suffered and enjoyed by the company which he represents in its efforts to prevent worms from developing in the figs in Turkey. Those with a problem in fruit fumigation may find the solution in the processes employed by the Moslems.

KILLING the "little bugs that Allah has given them" may seem a little absurd to the Turks, but they do it, and in a perfectly modern manner when they get started. It may take ten husky workmen to do the work that a couple of rather weak ones would do in an American fumigatorium, and they may tote their 400-lb. packages around on their backs instead of using trucks, but with equipment made in the United States and with the very latest in fumigating gases that will serve their purpose, the Moslems are treating their produce.

These Orientals, however, did not put aside their religious tolerance of the "worm" and adopt the strange and mysterious insect-killing processes on their own initiative. The incentive for the change came through "anti-worm" rulings in the United States, and practically all the technical developments and applications were made by an American concern which uses large quantities of Turkish figs in its products.

In 1927, the U. S. Department of Agriculture decided something must be done to curb the steady inflow of foreign-born "worms" to our country. At that time, one of the most important carriers of these insect immigrants was the fig. And, although worms had always appeared and were often declared to be an integral part of the fruit, a ruling was finally made that no lot containing more than 10 per cent of wormy or otherwise defective figs would be admitted.

Shortly after the 10 per cent restriction had been placed on figs, two large vacuum fumigators were taken over to Smyrna to treat shipments intended for the United States. At first, these were regarded with considerable suspicion by the Turks, but no harmful effects developed from their use and their value eventually became undeniably apparent. In addition to the vacuum outfits, the recent introduction of new and safer treating gases has made possible the building of atmospheric fumigation vaults on a rather large scale. Today, these vaults range in size from 1 cu.m. (35 cu.ft.) to 4,000 cu.ft. each.



One of the "baby" fumigators. These are lined with zinc and have a trough at the top to hold the liquid-carbon-disulphide fumigant.

To some, this unprecedented program of fig treating in a country as old as Turkey may seem somewhat overdone. This is not the case, however, for fumigation does not change the natural condition of the fruit in any way when the proper gases are used; besides, anyone who has ever lived along the northern shores of the Mediterranean will agree that *there* must lie the original paradise of unpampered "bugs."

Turkish figs are no more exempt from insect attack than those of any other country. Perhaps, due to their superior quality and the large supply of "attackers," they enjoy less freedom than the others. Their most undesirable enemies are generally considered to be the larvae (worms) of fig and Indian meal moths. These, if not prevented, will get into the figs at any time after the fruit begins to dry. Today, fig worms are becoming a minus quantity in Turkey—a *daha kuchuk kemiyet,* as the Turk puts it. In 1927, when the United States inspectors started counting worms, only about ten per cent of the figs coming from Turkey met with approval. This last season, with inspection easily twice as severe, less than ten per cent of the Turkish imports met with disapproval.

Fumigation of foodstuffs is similar to looking through a kaleidoscope—one never gets the same picture twice. Air humidity, temperature, elevation, and the humidity and oil content of the material being treated must all be known before a suitable fumigant can be chosen. Also, the tightness of the fumigating chamber and the roughness and absorptiveness of the material of which the vault is made often influence the choice of the treating gas and the determination of the necessary exposure period. A difference in any one of these factors may, and often does, so change the whole fumigating process that a fumigant which has shown 100-per cent efficiency in one locality will be a complete failure in another. In fact, this difference may appear in any two plants located in close proximity, especially when the fumigator construction is different. When the fumigation of figs was being started in Smyrna, several physical obstacles, as well as the previously mentioned psychological ones, were encountered; and, as there were no records to consult, each phase of the work required not only preliminary investigation but occasional "cutting and fitting" while the work was in progress.

Smyrna figs have thin skins and are completely filled with a soft, jelly-like pulp wherein the seeds rest. The proportionately small ratio of moisture to syrup in them makes drying a rather slow process, and, should the drying be carried too far, the fruit would be too firm to manipulate. For this reason, the figs are sent to the Smyrna packing houses with a soft moist interior, although dry on the outside. In this condition, they possess a strong affinity for water-soluble gases. To overcome the loss of fumigating gas effected by this absorbing property, the dosage and exposure time must be increased; and, whenever that is done, there is a possibility that the process will become too expensive to be economical.

Many Turkish figs are still sent from the orchards to Smyrna in 250-lb. jute bags of coarsely woven hair. The Turk's theory of the hair bags' basic value was that fig worms would not crawl through them; but whether this was to keep the insects in or out seems to be an uncertainty. Regardless of the material of which a bag may be made, it will not protect its contents from the rigors of Turkish transportation. When a 250-lb. bulk of soft, flexible, dried figs is packed in a bag and carried a few miles on a camel's back, then jolted for three days in a "nervous" flat car, to be transferred later to a springless cart and hauled over coarse cobblestone pavements, the mass is about as compact as a single fig when it arrives at its destination. In this condition, the figs furnish no ordinary problem in gas penetration.

Four years ago, because of the comparatively large ratio of inflow of fruit to handling facilities in Smyrna—25,000 to 30,000 tons in two months into a small town—fumigation was best accomplished in the 250-lb. bags, as received. Under these conditions, density and moistness of the material being considered, there was only one gas which qualified as thoroughly tried and approved. That was carbon disulphide. But while carbon disulphide was fully effective as an insect killer, it was so highly explosive that it could not be used safely by the Turk unless inclosed in an airtight container and blanketed with a non-explosive gas such as carbon dioxide.

After carbon disulphide had been selected, it was necessary to find a suitable means of applying it. Since it had been used successfully with the vacuum process for a number of years, two vacuum fumigators, as mentioned, were taken over from the United States.

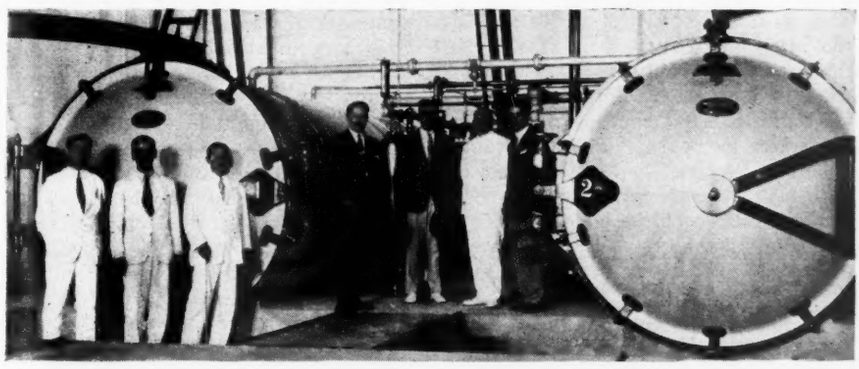
As expected, carbon disulphide, when used at the rate of 30 lb. per 1,000 cu.ft. of container space, evaporated thoroughly by heat and forced into the figs under the influence of a 27-in. vacuum, gave a 100-per cent kill as long as the temperature of the figs was above 55 deg. F. Below this point, it was found advisable to use 35 lb. of the gas for each 1,000 cu.ft. of space, or a two-hour exposure, to insure a kill.

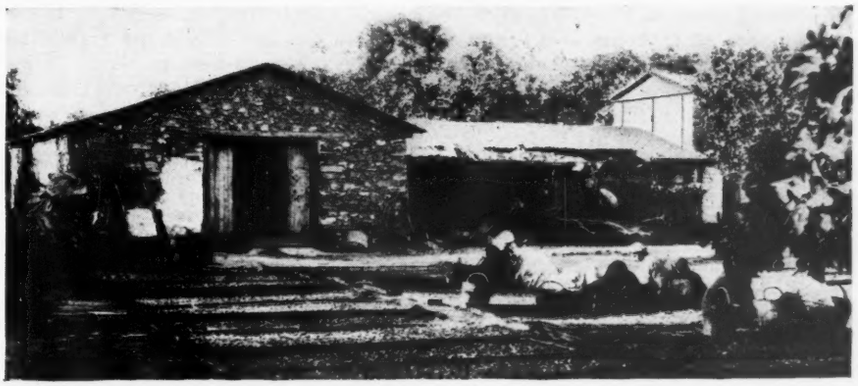
It became evident in time, however, that the high cost of carbon disulphide fumigation, as against the relatively small margin of profit on the figs, made the general use of vacuum fumigation almost prohibitive. Consequently, attention was turned to the procurement of another gas, notably, one that could be used in atmospheric vaults with safety and effectiveness.

Before the Smyrna fig season began in 1930, a gas mixture called carboxide, composed of ethylene oxide, one part, and carbon dioxide, nine parts, had made its appearance. Ethylene oxide was the toxic agent of this combination. In the United States, this substance had proved wholly satisfactory as a fumigant for such dry materials as cereals, beans, tobacco, well dried fruits and nuts, either when used alone or with carbon dioxide. Ethylene oxide, however, has a remarkable affinity for about every other liquid known, and it may be classed as a solvent as well. When considered for the treating of Smyrna figs, it was expected that a considerable percentage of the fumigant would go into the moist figs, resulting in a loss of concentration and necessitating an increased dosage or exposure period. But it was felt that its non-explosiveness and convenience of application in carboxide form might compensate for its defects, so it was given a trial.

There being no atmospheric fumigation vaults in Smyrna at that time, carboxide was first tried in the vacuum fumigators, in the 250-lb. bags. The results were discouraging indeed. It was asserted that 25 lb. of carboxide per 1,000 cu.ft. would produce a 100-per cent kill in cereals in one hour. This was taken as the initial schedule, but, although the temperature of the figs was about 80 deg. F. and a thorough check was maintained on every phase of the test, the kill was negligible. Thereafter, the dosage was increased 5 lb. each trial until 50 lb. was used. In addition, the exposure was extended to two hours, but still there were no favorable results. The temperature was above 68 deg. F. during the latter tests, and a full 27-in. vacuum was used to apply the gas. As it was evident that to go beyond a dosage of 50 lb. per 1,000 cu.ft. and an exposure of two hours would be to defeat the purpose of the vacuum system, as well as to make the cost greater than with carbon disulphide, the vacuum experiments were abandoned.

Since carboxide was chosen primarily because of its safety in atmospheric fumigation, the next step was to try it in vaults. Accordingly, an airtight vault of a 2,000-cu.ft. capacity was constructed. After several tests, it was found that 50 lb. of carboxide per 1,000 cu.ft. at above 68 deg. F. produced only a reasonable kill in the 250-lb. bags. Also, a further objection lay in the fact that with a 12-hour exposure, which





Above, one of Smyrna's vacuum fumigating units. This type of equipment is used to treat the figs in some of the larger producing centers. Below, a typical fig-drying yard in Turkey.

was desired, hardly enough gas could be gotten into the room to do the work. These trials revealed, however, that when treating small 30-lb. bags containing figs which had gone over the sorting tables and were ready to ship, a 100-per cent kill was obtained with 50 lb. of carboxide per 1,000 cu.ft. at 70 deg. F. and with a 12-hour exposure. It was further evident that these figures could not be reduced with safety. While the above tests would indicate that carboxide was not a success in Smyrna, it is believed its failure was due chiefly to the abnormal moisture and density of the figs. If dry materials were treated, or if longer exposures could be given to moist goods, its ease of application and inoffensiveness to most foods should still

which were first made for carboxide, although its success in these for a 12-hour exposure was not obtained with the ordinary procedure. E.C.M. boils at around 183 deg. F., and it evaporates comparatively slowly when applied in large quantities or when its saturation point (about 14 lb. per 1,000 cu.ft.) has been reached.

Tests with 20 lb. per 1,000 cu.ft. gave a 100-per cent kill in the 250-lb. bags in 24 hours with the temperature above 65 deg. F. Not quite all of the gas evaporated in that time, however, although the exposed surface was approximately 11 sq.ft. When doses above 20 lb. were used, or when the temperature was lowered, a proportionate decrease in evaporation resulted.

Smyrna. But to contemplate obtaining enough responsible people to operate large fumigating vaults in the many fig-growing centers of the interior country, where the stern hand of Mohammed still waves its spiritual ban on killing insects and other little animals, would have been a mighty task. In fact, it was considered impossible. However, the problem was finally solved by building a number of small atmospheric vaults and distributing them around to the various groves, these being supplemented by a few atmospheric vaults which were designed to be built the next season in the large centers of the interior.

These baby fumigators were made in the simple form of a square box one

Figs being brought in from the orchards on the Turkish "desert express." This type of transportation works the fruit into a compact mass, which adds to the complexities of fumigation.

Hauling fumigated figs to market in Smyrna by a more modern conveyance than the one on the left. This treated produce will pass inspection by the "worm counters" in American ports.

give it a valuable place in the list of fumigants.

Another gas which seems to have as much promise when all conditions are considered is the combination of ethylene dichloride, three parts, and carbon tetrachloride, one part, by weight. This mixture is frequently spoken of as "E.C.M." It has undergone considerable experimenting and has, in some respects, proved superior to carboxide and carbon disulphide. One of these is in the fumigation of Smyrna figs.

During the 1931 season in Smyrna, E.C.M. was tested in both vacuum and atmospheric fumigation. In vacuum, a 100-per cent kill was obtained by 25 lb. per 1,000 cu.ft., with a vacuum of 27 in. and one-hour exposure with the temperature at around 75 deg. F. Toward the season's end, when the temperature was about 50 deg. F., it became necessary to increase the dosage to 35 lb. and the exposure to two hours. There was no marked preference in the killing powers of E.C.M. over carbon disulphide in the vacuum system, however, nor was it quite as fast. But its safety, together with its cheapness, gave it what was considered a decided advantage.

The value of E.C.M. was more evident in the large atmospheric vaults

A 12-hour exposure was desired in the atmospheric vaults. Therefore, so that a larger quantity of gas could be used to compensate for the restricted time and that full concentration during the entire exposure might be obtained, a simple, electrically heated, hot-water bath was devised whereby the necessary quantity could be boiled off during the first 20 minutes. With the aid of the evaporator, it was possible to effect a 100-per cent kill in the 250-lb. bags in 12 hours with a dosage of 25 lb. per 1,000 cu.ft. During these tests, the temperature of the material was as low as 55 deg. F., but there were no ill effects from condensation.

While fumigation in Smyrna thoroughly destroyed all stages of infestation in the figs, it did not give a 100-per cent worm-free product. Consequently, if a passable product were to be obtained, these wormy figs had to be sorted out and discarded. Many of the eggs of the fig moth, which are laid on the fruit while it is on the drying trays, hatch out before the figs reach Smyrna. Therefore, the possibility of treating the fruit before the eggs hatched was next considered.

Dependable supervision for the unfamiliar and precise project of fumigation was difficult to obtain, even in

meter on a side. They were provided with a removable lid on top and were lined with zinc. A trough was placed around the top on the inside for holding the fumigant in the liquid state. As the boxes were small and were to be placed outdoors, where an explosion could do no harm, our old friend and "fast worker," straight carbon disulphide, was used as the fumigant.

These fumigators were checked carefully throughout the harvest last season, and the results were suprising. Although untreated figs came down to Smyrna testing as high as 30 per cent wormy, all fruits treated by these baby fumigators were 100-per cent free of insects in any form.

By next season, certainly, a larger number of those groves not in close proximity to the central fumigating vaults will have one or more of these small outfits in their drying yards. The product will be placed in them each day after it is dried and will be removed the following evening. Bagging and delivery to Smyrna will take place immediately.

Fig fumigation has become a commercial success in Turkey. And, besides, it has captured popular interest until it is somewhat of a national pastime.

Moisture in Flour and Starch Controls Heat of Hydration

By W. F. GEDDES
Professor of Agricultural Chemistry, University of Manitoba

MEASUREMENTS were made in our cereal research laboratory of the heat evolved when wheat flours differing widely in quantity and quality of protein were mixed with water. The data revealed, when the comparisons were made at the same moisture level, that the quantity and quality of protein and the particle size and source of starch had but little effect on the amount of heat liberated. On the other hand, it was found that the moisture content of the flours exercised a pronounced influence on the heat of hydration, as is shown by Fig. 1.

Heat of hydration values obtained for wheat starch are higher than those for wheat flour, which probably accounts for the rather slight influence of the protein. The heat of hydration of wheat flour is largely due to its starch content, since the quantity of starch greatly exceeds the quantity of protein and since the heat of hydration is greater for starch. Investigation of the effect of granulation of wheat flour showed that the extent to which the component particles of wheat flour are aggregated has no determinable effect on the heat of hydration.

Relative heats of hydration of the starch of rice, wheat, and potato are shown graphically in Fig. 2. By elutriation, the potato starch was separated into a coarse and fine fraction containing grains averaging 0.07 mm. and 0.01 mm. in diameter, respectively. The regularity of the results for each of these starches leaves no doubt that the heat of hydration of potato starch is greater than that of wheat, which, in turn, exceeds the values for rice starch at the same moisture level. From the relative positions of the three curves, the conclusion might be drawn that the smaller the granules, the less the heat of hydration. The values for the two fractions of potato starch, however, are practically identical, and it would thus appear that the heat of hydration of starches from various sources is not a function of particle size but rather of inherent differences in the starches.

So pronounced is the effect of moisture content on heat of hydration that it is of considerable practical interest. In bread manufacture, accurate control of the temperature of dough coming from the mixer is recognized as an important factor in the production of good bread. In experimental baking, it is the usual practice to bring the flours to a uniform temperature and, by a few trial mixings, determine temperature of the solutions required to bring the doughs out of the mixer at the desired temperature. It is obvious that such control may yield doughs of varying temperature if the moisture content of the several flours is not uniform. For example, it has been found that doughs mixed from 100 grams of flour containing 8 per cent moisture, came from the mixer at temperatures 3 deg. C. higher than doughs made from the same flour at 14 per cent moisture.

In our experimental milling practice, the wheat samples are conditioned to a uniform moisture content three days prior to the final tempering and milled in a room equipped with apparatus for humidity control. The resulting flours are of practically constant moisture content. If not baked immediately, these flours are placed in sacks and aged in the mill room.

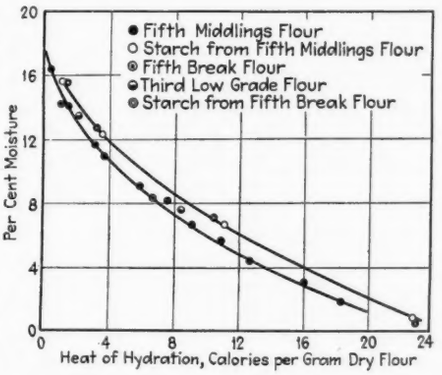


Fig. 1—Heats of hydration of wheat flour and starch vary inversely as their moisture contents. Starch has the higher values

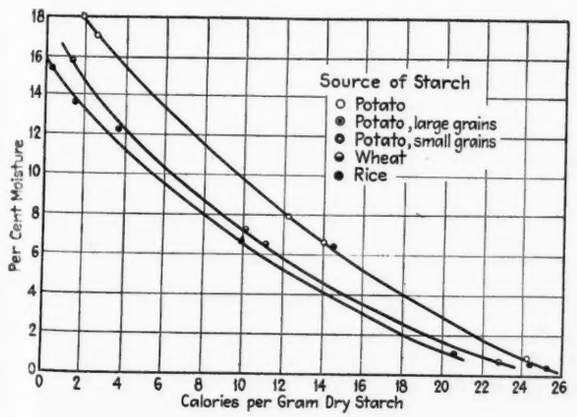


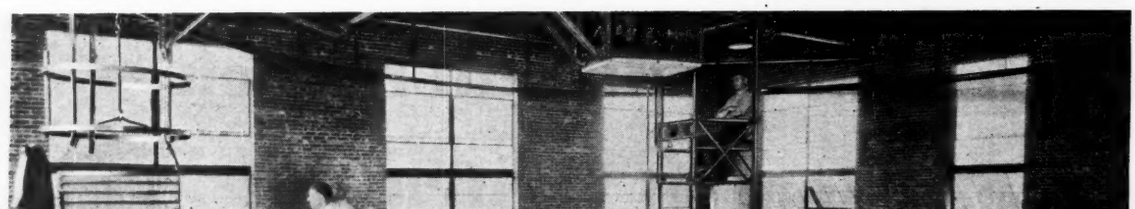
Fig. 2—Heat of hydration of starch varies with its source, but not with its granular size. Starch from wheat has a higher value than that from rice and a lower value than that from potatoes

Controlled Storage Is Simplest

In commercial bakery practice, several empirical formulas are in use for the calculation of dough temperature. However, most of them do not take into account the heat of hydration of the flour, and that is important. Although it would be quite possible to work out a formula including a heat-of-hydration factor, it is doubtful whether it would be generally adopted by the commercial baker because of its complexity. Therefore, from the practical standpoint, the simplest procedure is the maintenance of a uniform flour moisture by controlled storage conditions.

The pronounced effect of moisture on heat of hydration is of great importance also in the manufacture of baking powders. For this product, it is common practice to use dried cornstarch, the moisture content of which may be as high as 10 per cent or as low as 2 per cent, or less. When low-moisture starch is used, the heat of hydration must be carefully watched in the summer during periods of high humidity.

Doubtless there are many other practical applications of this work, but those given here serve to illustrate the importance of heat of hydration in industries using flour and starch.



The heart of a canning plant is the retort room, where the cans are sterilized by heat. Note the jet of steam from a bleeder near the right-hand window. Under today's methods it is necessary, but nevertheless wastes heat.

How the Canning Industry Uses Heat

Part III: Sterilizing and Evaporating

By ROBERT DILLMAN
Blue Island, Ill.

WITHOUT the use of heat—the cheapest known agent for sterilizing—there can be no canning industry. But, although heat is a relatively inexpensive form of energy, it must be used effectively and with economy. Previous articles in this series have discussed the use of heat in the preparation of raw materials and in exhausting. After exhausting, the cans are then sealed and further heated to the thermal death point of bacteria that may be present in the contents.

Exceptions to this procedure are found in pickles and sauerkraut, for these usually receive sufficient heat before the cans are sealed. Acid products, mostly fruits, are processed at atmospheric pressure, but non-acid products, such as vegetables, meat, fish, and the like, are heated by steam at pressures above atmospheric, because temperatures higher than those corresponding to this pressure are necessary for sterilization.

The simplest and oldest heating equipment for this purpose is a tank of boiling water. Cans of product are put in baskets or trays and lowered into the hot water, which is kept boiling by live steam. This is the so-called "open bath" or "open water-cook." Its efficiency depends entirely on the operator. Sufficient boiling must be maintained to cause good circulation, but it is easy to boil more than necessary and waste much steam. Because of variation in size of tanks and number of cans, the horsepower demand of units will vary so greatly that the most practical way is to figure horsepower for a canning line running at a definite speed.

Suppose we again figure on a tomato line, like that used to illustrate exhaust boxes. The iron baskets will have to be heated, and ordinarily they will weigh about 0.6 lb. per can contained, or 36 lb. of iron is to be heated per minute. Considering the average temperature of the contents 195 deg. F. and the average initial temperature 115 deg. F. and the average temperature of cans and crate 212 deg. F. and their initial temperature at 100 deg. F., the temperature increase will be about as follows:

100 lb. tomatoes raised 80 deg. F.
53.73 lb. steel raised 112 deg. F.
0.27 lb. tin raised 112 deg. F.

This equals 9,342 B.t.u. per minute, or 560,520 B.t.u. per hour, or 16.75 hp. at the kettles, or about 18 hp. at the boiler. Efficiency varies over a wide range, but, at an estimated 50 per cent, it would require about 36 boiler horsepower, although with careless operation it would take a great deal more. After cooking, the cans are simply air cooled or may be put into cold water for cooling.

This simple cooking equipment differs from all the other items covered because it is a batch operation and each unit does not operate continuously like the exhaust boxes and blanchers. It requires considerable labor, and the human element always is present, both in time of cook and keeping up the proper boil.

Many attempts have been made to make cooking a continuous operation, and today it has been developed to a high state of efficiency. The first and simplest continuous cookers were conveyors passing through hot water. They give a positive, dependable length of cook, but are quite clumsy and are likely to be big steam users. They are about the cheapest continuous cookers made. In them, as in the cooking tanks, the cans remain perfectly still during the cook; hence the term "still cook." Because of the comparatively small difference of temperature between the outside heating medium and the contents of the cans, as well as the lack of any ebullition, the convection currents in the can are very sluggish and heating is very slow.

About twenty years ago the attempts to make continuous cooking equipment resulted in two distinct types of so-called agitating cookers. One was the "Wonder Cooker" and the other the "Anderson-Barngrover Cooker." The former rolled the cans on plates by means of rods extending between two parallel conveyor chains. They were rolled back and forth, going one way in boiling

water and the other way in steam. The A.-B. cooker uses a T-iron spiral guide and an angle-iron circular reel to carry the cans, which are in boiling water about one-quarter of each revolution and in steam three-quarters of the time. Mechanically the Anderson-Barngrover Cooker was the more dependable, but for positive agitation and quick cook the Wonder Cooker was superior. It is no longer being made, however. Several other types of conveyors have been designed for continuous cookers with more or less success, but none has met with equal favor.

For a given number of cans of product per minute and equivalent cooks, the steam demand, measured in horsepower absorbed, will be the same in continuous cookers as in tanks. But the equipment will be smaller and practically closed except for the inlet and discharge openings, so that the losses will be much reduced and the equipment much more efficient. The manufacturer estimates the steam demand for the tomato set-up, illustrated previously, at ab 25 hp. This would mean a heat effi cy of about 72 per cent, which is much better than can be attained with open tanks. These cookers are big labor savers also. Automatic temperature controls are not applicable to them.

Non-acid products, requiring temperatures higher than are possible with boiling water, were formerly cooked in a solution of calcium chloride and water. The calcium chloride raised the boiling point, but it was not satisfactory. This development was followed by the closed tank or retort, where pressure could be maintained, so that the boiling point of water was raised by this means. Usually saturated steam is used as the heating medium, but sometimes some water also is used. In the processing of glass jars —a special case—water is used to fill the retort.

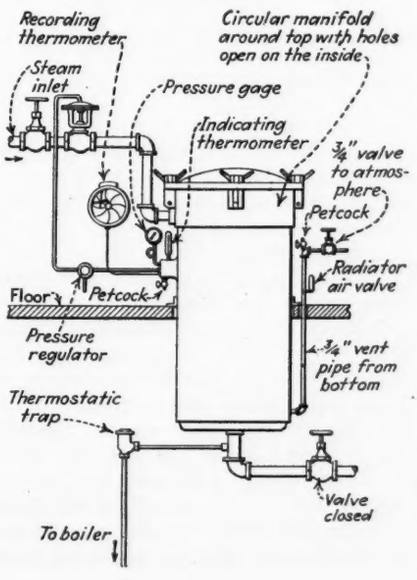
The standard retort is a steel tank about 40 in. in diameter and 72 in. deep, and has a cast-iron cover that can be quickly bolted or unbolted. The cover usually is hinged and counterweighted to make handling easy. As usually connected, it has a steam inlet in the bottom, a drain in the bottom, a vent on top and a thermometer pocket on the side with a vent in it. The retort is equipped with pressure gage, safety valve and thermometer. If cooling is done in the retort, it has water connections at either top or bottom and it may also have a compressed-air connection. It may be equipped with automatic control apparatus, varying from a simple pressure or temperature controller to a complete process-cycle control that governs the whole process, including cooling water, compressed air, and length and temperature of cook.

Let us examine the fundamental principles of the ordinary standard retort. Suppose it is full of cans, the cover closed, and all ready to start. If it is well equipped it will have a ¾-in. vent on top in addition to the small petcock, and both these will be wide open. Steam will be turned into the bottom and an attempt made to force the air out the top, but, as air is heavier than steam, a turbulent motion will take place in the retort and the air and steam will be pretty well mixed. Finally, by forcing a considerable quantity of steam through the retort, most of the air will be swept out, but it requires much time. The ¾-in. vent on top will then be closed and the small vents left open. For a considerable time spurts of air will come from these vents. True, some air enters the retort with the steam, but most of the air is the remainder of that which was in the retort at the start. All instructions of today for retort operation direct that it be well vented, and it is easy to see why this is necessary with retorts connected as described.

Now suppose we attack the matter in a scientific manner. At the outset the retort is filled with cool air, which is much heavier than steam. The logical thing to do is let the steam in at the top and let the air escape at the bottom, which can take place without any turbulence and more quickly than by blowing it out at the top. Furthermore, even after coming up to temperature, the air is still 50 per cent heavier than steam. Air which comes in with the steam during the operation of the retort will tend to sink to the bottom. Thus, with nothing more than a small vent at the bottom, when the steam is entering the top it will be sufficient to take care of the process in an efficient manner.

In order to try this out in an actual installation a regular standard retort was connected up as shown below.

This is an entirely new way to pipe a retort in a manner which conforms to engineering knowledge and common sense. Steam is admitted at the top instead of the bottom.



Steam enters around the inside of the top through a series of holes. All vents are closed except a very small one on the thermometer pocket. A ¾-in. pipe was tapped into the side of the retort at the bottom and came up through the floor of the process room and was equipped with a ¾-in. valve, a common radiator air relief valve, and a petcock. Condensate was removed by a thermostatic trap on the drain. In order to check the results carefully, a pressure controller and a recording thermometer were used. Operating in this way, air pockets would be manifested by variations in temperature while a constant pressure was maintained.

In operation the steam was turned on full, as also was the ¾-in. vent from the bottom. Only air came out of this vent for some time. When all the air was out it was shut off. Temperature quickly rose to that corresponding to the steam pressure maintained, and remained there. Finally, even the vent on the thermometer pocket was closed, so that the radiator air valve was the only means of relieving the air. This allowed air to escape at intervals during the entire cook. The temperature was very uniform, as was shown by the recording thermometer, and was somewhat better than a duplicate retort connected in the usual orthodox manner. Samples of pork and beans chosen from various parts of the retort showed uniform cooks.

Now let us examine the whole matter from the standpoint of heat required. At the outset, the retort is cool and has been charged with three baskets of cans, more or less hot, and the cover closed. Steam is turned on full. The cold retort and the crates are heated quickly. Together they weigh 3,000 lb., so that the temperature rise of 160 deg. F. requires 55,920 B.t.u. If we absolutely neglect the cans or vents and consider that only this retort and the crates are heated in three minutes, the steam consumption will be about 36 hp. In the ordinary retort the large vent will discharge much steam, and cans being heated also will condense some. Thus the initial load while coming up to temperature is very great and, therefore, the "coming-up" time is governed to a great extent by the size of the steam piping. The usual retort takes much longer than three minutes to come up to temperature because the piping is too small for this speed.

After the retort temperature is up to the processing temperature, the steam demand is much reduced. Radiation, steam escaping at the vents, and the heating of the contents of the cans now account for the load. Radiation varies considerably with the temperature of the retort room and drafts of cold air blowing against the retorts, but a test under average conditions has shown this to be about 5 boiler horsepower

when operating at 15 lb. pressure per square inch. A $\frac{1}{8}$-in. petcock under these conditions accounted for a $\frac{3}{4}$-hp. steam waste. A battery of retorts operating on pork and beans under actual test with a steam-flow meter averaged $16\frac{1}{2}$ hp. steam consumption each. It is probable that the average retort, operating under 15 lb. pressure and requiring five minutes "coming-up" time, will take about 40 hp. at the start, but this will drop to about 20 hp. when it is up to temperature. The demand will further gradually drop to about 8-10 hp. at the end of the cook. It should be noted also that, if cooling is done in the retort, so that it is cold at the start of the next processing cycle, the coming-up time will be lengthened, because it always takes all the steam that the pipes will carry at the start, anyway, and this is the only way to supply additional heat.

Since almost a third of the average horsepower demand of a retort is radiation, it is easy to see that proper insulation will save steam. In addition, if the piping is scientifically designed as described, vents are reduced as much as possible, and a good trap is installed, the steam consumption of the average retort room will be greatly reduced and the condensed steam can be returned to the boilers.

Many variations of the standard retort are in use. Some are smaller, others are rectangular and horizontal with the doors on one or both ends. Still others are horizontal cylinders 16-18 ft. long and 5-6 ft. in diameter, with a door in each end. Cars on tracks are used for charging these larger ones.

For many years attempts were made to design continuous-retort equipment for pressure cooking. Retorts that were more or less automatic in charging and discharging were suggested and were supposed to save labor and handling, but they did not save any steam. Finally the continuous equipment described in Food Industries, December, 1929, was developed. This saves a great deal of steam because it eliminates the heating and cooling of the retorts and it can be well insulated. As might be expected, however, it requires considerable time and a big boiler load to bring it up to temperature at the start of the run.

Evaporation in Canning

Evaporation is not a very large item in most canning processes. Tomato products, apple butter, preserves and jelly are the main products. The evaporation of pineapple juice to be used as syrup is a special case which has been worked out in Hawaii. Evaporation usually takes place by heat from steam on one side of a metal wall and the liquid to be evaporated on the other. The heat passes through the metal from one to the other. Speed of evaporation depends on a number of factors, the chief of which are the temperature difference between steam and evaporating liquid, kind and thickness of separating metal, condition of surfaces of metal, consistency and nature of boiling liquid, speed of movement of steam and boiling liquid past the surface of separating wall, and the efficiency with which the condensed steam is removed from the steam chamber.

Speed of evaporation is very important in nearly all cases, with the possible exception of apple butter, and requires that the equipment be carefully selected from that viewpoint. Another point, however, is the length of time in which any one batch of product is to be heated, a factor which controls the size of the individual units and the ratio of heating surface to volume. Jelly and preserves cannot remain hot very long or the pectin will be broken down by hydrolysis and the quality of the product adversely affected. To meet this limitation, small, shallow, jacketed kettles are used, and small batches are finished quickly. Tomato pulp and catchup are evaporated in large batches, as a rule, but more attention could advantageously be given to the small-batch idea. Wood- or glass-lined steel tanks are commonly used at present, with copper steam coils for heating. Apple butter can be kept hot for some time and evaporated slowly without affecting its quality. Jacketed kettles usually are used for apple butter, for they permit mechanical stirring, which is necessary on this thick product because of its lack of circulation.

Vacuum evaporators are often discussed in connection with tomato products, jellies and preserves, but, in my opinion, they cannot be recommended from the standpoint of heat economy alone. The investment is very great as compared with open equipment, especially for a short operating season such as is the case with tomatoes. The fact that evaporation of the product takes place at 140 deg. F., or lower, is partly offset by the fact that the temperature of the finished product must be raised almost to boiling to accomplish sterilization. Unless the production thereby of a very superior product is a well demonstrated fact, and unless it will actually sell for more money than the open-kettle product, the use of vacuum evaporator equipment is not indicated. Special conditions such as a great surplus of exhaust steam might change this conclusion, but such a surplus is not probable in canneries.

From a heat consumption standpoint there are a few fundamental facts to consider. The heat necessary to evaporate one pound of water at sea level is about 970 B.t.u. Under a vacuum of 24 in. of mercury, where it boils at 140 deg. F., the necessary heat is approximately 1,013 B.t.u. At 100 lb. boiler pressure, which will have a temperature of 338 deg. F., it will be 880 B.t.u. Evaporation, fundamentally an exchange of latent heat, always condenses more steam in the coils or jackets of evaporators than is boiled from the product. Since individual operating conditions govern this ratio, each case should be considered separately, but it is a good rule to figure the necessary steam will equal the evaporation from product plus 10 per cent. After the steam in the coil or jacket is condensed, the return of this hot water to the boiler is often accompanied by great heat losses. On all other equipment here considered, except possibly retorts, the steam load is non-return, which means that there is no condensed steam suitable for boiler-feeding purposes to take back to the boiler. It is inconceivable that an evaporation load should be operated non-return, although it is done occasionally even now.

Consider, as an example, a catchup cooking tank with a capacity of 600 gal. of raw juice from which we will boil 350 gal. of water. Boiling alone requires one-half hour for completion, hence the steam consumption will be at the rate of 6,414 lb. per hour. If we disregard radiation losses in pipes, etc., and assume that the hot condensate is wasted, and further assume the steam at 100 lb. pressure, with feed water at 100 deg. F., this would be equivalent to approximately 215 hp. If this hot water is fed back to the boiler through traps and an open heater, with feed water at 200 deg. F., the load will be 195 hp.; but if we have the cook tank at a high elevation with a back-to-the-boiler system completely closed, it will be only about 170 hp. This last is extremely good for usual practice, but might almost be realized. Somewhere within these limits will be found figures to represent conditions in actual practice, and they show that big savings are possible.

There are some simple ways for the average cannery superintendent to follow his heat consumption and losses. Remember that coal, gas or oil is purchased for the potential heat it contains, and this heat is to be used for definite things. This heat can escape only as steam, hot water or as hot air from hot surfaces. Investigate all clouds of steam to see that they actually are legitimate, or have been reduced as much as possible. Have simple drains that will allow the detection of hot-water waste. Follow up all hot water in drains to see that it is reduced as much as possible or piped to the boiler room. Watch for hot water going down the sewer from the boiler room, such as overflow from open-feed water heaters, accumulation tanks or hot wells. Investigate all hot surfaces to see if they can be insulated to advantage. If you have never done so, it is a good idea to have a competent engineer go over the plant and help you find the leaks and assist in correcting them.

WHAT'S ON YOUR MIND?

Defending the Hydraulic Press In Coffee Extract Manufacture

To the Editor of FOOD INDUSTRIES:

In his fair and illuminating article, "Where Liquid Coffee Stands Today" (FOOD INDUSTRIES, April, 1932; pp. 129-131), Dr. G. L. Wendt has mentioned the hydraulic pressure process (U. S. Patent Application Serial No. 420678) and stated that in his opinion it is inefficient because of the large quantity of solution still remaining in the grounds. I deem it necessary, therefore, to say a few words in defense of this process.

When roasted coffee is extracted with water which is heated to or near to the boiling point the aromatic substance in the coffee is changed chemically—probably by hydrolysis of aromatic esters which have been formed during the roasting. The aroma of roasted coffee and the aroma of boiling coffee are different.

The aroma produced and absorbed by boiling water is far less stable in the water than the aroma produced by heating of the coffee bean. The fresh-made coffee solution in the household is stale in a few hours. Any boiling of a coffee solution, even under vacuum, must result in partial or total loss of aroma. Furthermore, the dehydrated and caramelized sugars present in the roasted bean are hydrolyzed and partly converted by prolonged boiling to produce a very objectionable licorice- or molasses-like taste and aroma.

In the preparation of liquid coffee, the coffee solution cannot be boiled or evaporated even under vacuum. Liquid coffee, to be appreciated by the consumer, must be entirely free from molasses or licorice taste. There should also be present the distinct odor of the non-hydrolyzed aroma of freshly roasted coffee. A teaspoonful of liquid coffee should be sufficient to produce a cup of coffee. A cup of coffee thus made should have the distinct aroma of the blend from which it is made.

Such results cannot be obtained by percolation or any other method in which a large amount of water is used. The drip method in the household extracts less than 50 per cent of the valuable ingredients of the coffee. The percolator method in the household extracts less than 75 per cent in 20 minutes of percolation, which is too long a time to produce a good beverage. In liquid coffee factories, where a series of extractors are used and the coffee solution is gradually strengthened by circulating it from one extractor to the other, while the first used extractor is treated with fresh water, the time during which the coffee solution is subjected to heat is too long, so that the aroma of the coffee at this stage has already been spoiled. Under the best conditions the operation takes longer than an hour, extracts only 85-90 per cent, and produces a very weak solution of about 5 per cent solids.

If one teaspoonful of liquid coffee is sufficient to produce one cup of coffee, the liquid coffee must contain at least 40 per cent of solids. If one has 800 gal. of a 5-per cent solution, 700 gal. of water must be evaporated to obtain 100 gal. of a 40-per cent solution. During this evaporation the aroma is entirely spoiled. If the extraction produces a higher concentration, the time of extracting must be longer or the yield smaller. If the time of extraction is shortened the yield will be smaller or a larger amount of water must be used, with the result that the solution is thinner.

The hydraulic pressing process does away with all these obstacles.

As Dr. G. L. Wendt states in his article, roasted coffee absorbs 160 per cent of its own weight in water. Where does this water go? Approximately 60 per cent is absorbed by the fiber and 100 per cent enters the cells which contain the valuable ingredients of the coffee. The water in the fiber is without value. The water, having entered the burst cells, immediately dissolves all the soluble particles. As each cell must be pictured as having only a small opening through which the steam during the process of roasting has escaped, it is extremely difficult to wash out of the cells this solution which has formed in them with additional amounts of water. With ordinary methods of extraction it requires many washings to obtain satisfactory results.

The hydraulic pressing method removes the total liquid from the cells and leaves only the water in the fiber. It is possible to produce with this method a 40-50 per cent solution without evaporation in a very small fraction of the time necessary for the percolation method. The ingredients of this solution have not been hydrolyzed; therefore they contain the unchanged original aroma. The yield is 99.5 per cent. The operation costs are far lower than those involved in any other process.

It is a question whether liquid coffee should or should not contain coffee oil. I believe it should. If one makes a cup of coffee by the percolator method, small globules of oil are observed swimming on top of the coffee in the cup. This oil is absolutely harmless and contributes to the lingering taste of coffee in the mouth after one has consumed the coffee. The coffee oil can be readily removed during the manufacture of the liquid coffee, as it comes to the surface in the container and forms a layer there. If the liquid coffee together with the oil is filled into the bottles, it comes to the top and forms a layer in the neck of the bottle, making an effective seal against oxidation of the contents of the bottle. In many food products—for example, *pâté de fois gras*—natural fat is used as a seal against oxidation.

The importance of fat in coffee can be clearly realized. This fat, or coffee oil, in addition to the small amount of wax, is the only substance capable of holding the developed aroma in the coffee bean. Roasted coffee beans contain about 14 per cent of this substance. Because it is finely spread through thousands of cells in the coffee bean, its surface exposure is many thousand times greater than if it were condensed in one single drop. The fat, if separated from the coffee bean, tenaciously holds the aroma of the roasted coffee bean and becomes no more readily rancid than, for example, cocoa butter, which is practically the same substance chemically but has the aroma of cocoa. But where such a tremendously large surface of a relatively small quantity of coffee oil is exposed to the air it quickly loses its aroma and becomes rancid. That is why roasted coffee beans become stale very quickly. Vacuum packing betters this condition but does not eliminate it.

Liquid coffee in its best form cannot be kept indefinitely. It does not become rancid, sour, or moldy. It simply loses its aroma gradually. While freshly roasted coffee loses the greater part of its aroma after one week, liquid coffee loses the greater part of its aroma after four weeks. There is no reason why liquid coffee cannot be replenished on the grocer's shelf as often as fresh coffee.

If a coffee product is desired which will keep for an indefinite length of time, dry soluble coffee must replace liquid coffee. The high concentration of liquid coffee, made according to the pressing process, makes the manufacture of dry soluble coffee a simple matter.

CURT BREDT, President,
Straitway Coffee, Inc.,
Keyport, N. J.

Fat and Oil Supply Depends Upon World-Wide Factors

Statistical picture of world relations, relative commodity importance and principal supplies for food use

By R. S. McBRIDE
Assistant Editor, Food Industries

FATS AND OILS are among the most important food raw materials. A proper understanding of the conditions affecting their supply demands a world view. Also the important commodity relations between the major food oils can be understood only when their relative importance is measured statistically.

The vegetable oils afford an outstandingly large part of the entire fat and oil supply of the world. Approximately 17 billion pounds is available annually in various oil raw materials.

The relative importance of the various countries of the world in the business of supplying each of the major vegetable oils is clear from Table I. From that chart it is evident that the United States is an important producer, even an exporter of some of the oils. The dependence of the United States on foreign raw materials, however, is almost complete in many cases. These facts account for the considerable attention which has been given to this problem in tariff making. This importance from a tariff-making point of view has occasioned the recent report of the U. S. Tariff Commission, which discusses particularly copra, coconut, palm, palm-kernel, sesame, perilla, rapeseed and whale oils. It is that report which gives the accompanying data and on which this summary of our world relations has been based.

Corresponding data on the world supplies of animal oils cannot be had. But the United States, undoubtedly the chief producer of the major food fats from animal sources, makes only two billion pounds of butter, 1.5 billion pounds of lard, 500 million pounds of tallow, and 300 million pounds of other greases. The world output of marine animal oils appears large in comparison—about 1.75 billion pounds, of which nearly 1.5 billion pounds is whale oil, produced principally in Norway and the United Kingdom.

Table I—Principal Countries Interested in Vegetable and Whale Oils

Oil	Chief Countries					
	Producing Raw Material	Exporting Raw Material	Importing Raw Material	Producing the Oil	Exporting the Oil	Importing the Oil
Cottonseed	United States, India, Egypt	India, Egypt	United Kingdom	United States, United Kingdom, Egypt	United States, United Kingdom, Egypt	Canada, Germany, Netherlands
Peanut	India, Africa, China	India, Africa	France, Germany	France, Germany, China	France, Germany, China	United Kingdom, Netherlands
Olive	Spain, Italy, Greece, Portugal, N. Africa			Spain, Italy, Greece, Portugal, N. Africa	Spain, Italy	United States, France, United Kingdom
Coconut	Philippine Islands, Netherlands, E. Indies, Ceylon, British Malaya, India, S. Pacific Islands	Philippine Islands, Netherlands, E. Indies, Ceylon, British Malaya, S. Pacific Islands	United States, Netherlands, Germany, France	Philippine Islands, Netherlands, E. Indies, Ceylon, India, United States, Netherlands, Germany, France	Philippine Islands, Ceylon, Netherlands	United States, United Kingdom
Linseed	Argentina United India, U.S.S.R.,* Canada	Argentina, India, Canada	United States, United Kingdom, Netherlands, Germany	United States, United Kingdom, Netherlands, Germany, U.S.S.R.*	Netherlands, United Kingdom	United Kingdom
Soybean	China	China	Japan, United Kingdom, Germany	China, Japan, United Kingdom, Germany	China, Japan, United Kingdom, Germany	United Kingdom, Netherlands
Sunflower	U.S.S.R.,* China	U.S.S.R.,* China	Germany, United Kingdom	U.S.S.R.,* China United Kingdom, Germany		
Rapeseed	India, China	India, China	Japan, United Kingdom, Germany, Netherlands	Germany, India, China, Japan, United Kingdom, Netherlands	Japan, United Kingdom	United States
Sesame	India, China	China	Netherlands, Germany, United Kingdom, France, United States	India, China, Netherlands, Germany, United Kingdom, France, United States	Netherlands	United States
Palm-kernel	Africa, Netherlands, E. Indies	Africa, Netherlands, E. Indies	Germany, United Kingdom	Germany, United Kingdom	Germany, United Kingdom	United States,
Palm	Africa, Netherlands, E. Indies			Africa, Netherlands, E. Indies	Africa, Netherlands, E. Indies	United States, United Kingdom
Hempseed	U.S.S.R.*			U.S.S.R.*		
China wood	China			China	China	United States
Perilla	China	China	Japan	China, Japan	China, Japan	United States
Whale	Antarctic waters			Norway† United Kingdom†	Norway, United Kingdom	United States, Germany
Corn	United States			United States		

*Union of Socialist Soviet Republics (Russia). †Vessels registered under flags of these countries.

A complete statistical picture of these relationships is not available, but the vegetable oil statistics are fairly complete, as shown in Table II. Actual production is less in some cases, because certain seed supplies are not used for oil production; but in other instances actual production probably exceeded the figures indicated, because of supplies made and utilized locally. Precise production statistics are not possible, but the figures give a proper indication of the potential world supply of vegetable oils in recent years. It will be noted that although the world output of individual oils varies considerably from year to year, the grand total supply of all has in recent years been fairly uniform.

Foreign sources have supplied a constantly increasing share of the oils consumed in the United States during recent years. Imports of the oils as such have increased from 827 to 1,124 million pounds between 1923 and 1930, while exports have decreased from 1,373 to 873 million pounds during the same period. Thus our status as a net exporter has changed to that of a net importer of oils. If one includes oils produced from imported raw materials in the comparison, the change in this period is from an almost even balance of imports and exports to an excess of approximately a billion pounds per year of imports over exports in 1929 and 1930. In other words, oil and oil raw materials imported exceed those exported by a billion and a quarter pounds annually of oil equivalent.

The food industries, as well as the other fat and oil-using groups of the United States, must take account of this situation very carefully. The average situation for the five years from 1926 to 1930 is shown in Table III. From that data one can quickly gain a good idea of the average relationship between

Table II—Available World Supplies of Principal Oils, Estimated on the Basis of Oil Seed Production in All Important Producing and Exporting Countries

Oil	Oil Equivalent of Raw Material Per Cent	Production in Terms of Oil — Million Pounds							
		1923	1924	1925	1926	1927	1928	1929	1930
Cottonseed	15	2,689	3,106	3,539	3,511	3,466	3,740	3,730	3,524
Peanut	28	1,759	2,197	2,596	2,506	3,067	3,262	2,782	2,200
Olive	..	1,543	1,720	1,442	1,287	2,349	1,496	2,695	(1) 968
Coconut	65	1,387	1,488	1,513	1,686	1,724	1,721	1,793	1,552
Linseed (2)	33	2,109	2,271	2,653	2,648	2,799	2,596	2,002	2,596
Soybean	15	933	959	1,143	1,346	1,361	1,493	1,557	1,264
Sunflower (3)	22	869	709	1,295	830	1,111	1,129	1,143	1,062
Rapeseed	38	1,139	1,112	1,219	1,004	1,048	931	881	1,041
Sesame	45	(4) 445	654	522	538	665	620	547	470
Palm-kernel (a)	45	483	535	584	575	593	550	538	(5)
Palm (b) (6)	..	330	418	447	412	435	477	532	(5)
Hempseed	30	266	245	408	390	408	414	415	395
Tung (7)	..	112	119	119	100	120	101	119	156
Total		14,064	15,533	17,480	16,833	19,146	18,530	18,734	(1) 15,228
Total excluding (a) and (b)		13,251	14,580	16,449	15,720	18,118	17,503	17,664	(1) 15,228

Source: *Foreign Crops and Markets*, U. S. Department of Agriculture.

(1) Total in 1930 affected largely by the abnormally low olive oil production.
(2) Five chief producing countries.
(3) Russia only for 1924; Russia and Bulgaria, 1925 to 1930.
(4) India only.
(5) Data not available.
(6) Includes some palm-kernel oil.
(7) Exports from China.
(8) These oils are excluded in order to make other years comparable with 1930.

Table IV—Principal Uses for Oils and Fats

Edible Uses	Soap	Paint, Varnish, Linoleum
Butter	Tallow, inedible	Linseed oil
Lard	Greases	Tung oil
Tallow, edible	Coconut oil[3]	Soybean oil
Cottonseed oil	Palm oil	Perilla oil
Olive oil, edible	Palm-kernel oil[2]	
Peanut	Olive oil, inedible	
Corn oil	Olive oil foots	
Sesame oil[1]	Whale oil	
Sunflower oil[1]	Seal oil	
	Fish oils	
	Vegetable tallow	
	Cottonseed and other vegetable oil foots	

[1] Used for inedible purposes when denatured.
[2] Used for edible purposes when not denatured.
[3] Coconut oil is used 60 per cent for soaps; 40 per cent for edible purposes.

Table III—Average Figures for the Five Years 1926 to 1930, Inclusive, for Production, Import, Export, Change of Stock, and Apparent Consumption of Oils and Fats

Commodity	Domestic Production	Imports for Consumption	Exports of Products of the U. S.	Stocks January 1	Stocks December 31	Apparent Consumption	Factory Consumption	Excess Apparent Consumption Over Reported Factory Consumption
	(Thousands of pounds)							
Oils and fats	5,657,289	1,023,616	890,406	805,053	899,443	5,696,109	4,210,259	1,485,850
Vegetable oils	2,876,289	883,443	72,775	523,127	564,533	3,645,551	3,196,522	449,029
Supplied primarily from domestic materials	1,784,708	4,275	31,695	150,510	150,921	1,756,877	1,750,574	6,303
Cottonseed	1,646,401	1,336	31,115	137,102	136,258	1,617,466	1,613,676	3,790
Peanut	15,060	2,938	.....	1,753	3,022	16,729	14,217	2,512
Corn	123,247	.....	580	11,655	11,641	122,681	122,681	.....
Supplied from both foreign and domestic materials:								
Linseed	705,634	5,570	2,171	164,568	156,083	717,518	452,363	265,155
Supplied primarily from imports or from imported materials	385,947	873,598	38,908	208,048	257,529	1,171,156	993,586	177,570
Coconut	311,786	311,899	23,127	101,074	123,576	578,056	568,140	9,916
Soybean	7,169	15,481	5,416	5,883	7,994	15,123	16,446	—1,323
Olive, edible	1,373	84,025	.....	5,101	5,375	85,124	2,255	82,869
Palm-kernel	(1) 142	56,160	.....	10,346	11,334	55,314	51,219	4,095
Chinese wood oil	.....	105,595	.....	24,737	28,127	102,205	89,396	12,809
Palm	.....	201,839	.....	31,896	45,492	188,243	165,312	22,931
Olive, inedible	18	9,727	.....	1,641	1,620	9,766	6,716	3,050
Sulphur oil or olive foots	.....	46,163	.....	6,721	10,801	42,083	37,283	4,800
Rapeseed	(2) 35	18,126	.....	4,710	5,170	17,701	14,323	3,378
Chinese vegetable tallow	.....	6,689	.....	1,251	1,859	6,081	5,449	632
Castor	56,698	336	.....	7,707	8,318	56,423	22,765	33,658
Other (unspecified)	8,726	17,558	10,365	6,981	7,862	15,038	14,281	757
Animal fats and greases	2,684,236	20,451	816,715	191,781	216,875	1,862,878	838,769	1,024,109
Supplied primarily from domestic materials:								
Edible fats	1,765,523	239	747,203	64,374	64,404	1,018,529	74,582	943,947
Lard, neutral	43,599	19	18,867	3,450	3,203	24,998	23,868	1,130
Lard, other	1,675,200	220	722,360	57,113	57,337	952,836	16,242	936,594
Tallow	46,726	.....	5,977	3,810	3,864	40,695	34,472	6,223
Inedible fats and greases	918,712	20,213	69,512	127,407	152,471	844,349	764,187	80,162
Tallow	534,016	11,638	(3)	75,817	93,627	(3)	527,844	(3)
Wool grease	7,391	8,575	(3)	3,122	3,360	(3)	5,973	(3)
All other greases	377,305	.....	(3)	48,468	55,484	(3)	230,371	(3)
Marine animal oils	96,763	119,722	916	90,146	118,035	187,680	174,968	12,712
Supplied from both foreign and domestic materials:								
Menhaden (domestic only) and herring (including sardine)	81,636	31,171	(3)	44,671	60,999	(3)	85,616	(3)
Supplied primarily from imports or from imported materials	15,129	88,550	(3)	45,474	57,036	(3)	89,351	(3)
Cod and cod liver	1,732	34,313	(3)	8,139	9,151	(3)	15,730	(3)
Whale	10,432	50,012	(3)	29,921	37,402	(3)	64,862	(3)
Sperm	435	2,340	(3)	2,449	2,951	(3)	932	(3)
Other	2,530	1,886	(3)	4,965	7,532	(3)	7,828	(3)

Sources:

(a) *Animal and Vegetable Fats and Oils*, published annually by the Bureau of the Census, U. S. Department of Commerce, for statistics on production, stocks, and factory consumption.

(b) *Foreign Commerce and Navigation of the United States*, Tables 9 and 3, published annually by the Bureau of Foreign and Domestic Commerce, U. S. Department of Commerce, for statistics on imports and exports.

(1) Production reported in 1930 only, used as basis for five-year average.
(2) Production reported in 1926 only, used as basis for five-year average.
(3) Cannot be segregated.

Table V—Percentage Consumption in United States for Food, Soap, and All Purposes Supplied by Lard, Other Domestic Oils, and Foreign Oils in 1914 and 1929

	Lard Domestic	Other Domestic Oils	Total Foreign
		—Percentages—	
Consumption for food, Excluding lard:			
1914	....	99.2	0.8
1929	....	86.2	13.8
Including lard:			
1914	42.7	56.8	0.5
1929	45.3	47.2	7.5
Consumption for soap:			
1914	1.4	77.3	21.3
1929	....	51.2	48.8
Consumption for all purposes, Excluding lard:			
1914	....	90.0	10.0
1929	....	70.4	29.6
Including lard:			
1914	33.1	60.2	6.7
1929	30.0	49.3	20.7

domestic supply, average consumption, import and export, and stocks on hand. It should be noted, however, that oleo oil, oleostearin, fatty acids, other derivatives, and products of which oils and fats form an important raw material are excluded from the table.

As classified by the U. S. Tariff Commission, the principal uses of these oils are as given in Table IV. In each group the oils are listed in approximately the order of importance measured by the quantity used.

In addition to the oils listed in Table IV there are important miscellaneous uses for others. These, in the order of quantity consumed, include the following: castor oil, rapeseed oil, sperm oil, cod and cod-liver oil, sod oil, wool grease, neat's-foot oil, almond oil, and croton oil.

The relative importance of the various oils and their comparative relationship to lard is still more strikingly brought about by Table V, which expresses the percentage of total consumption of the principal oils on different bases. It is evident from the table that although lard is outstandingly the most important single food-fat other than butter, other domestic oils as a whole are of equal importance and imported oils now represent a significant part of the total supply. In the case of soap oils, it is interesting to note that the foreign and domestic supplies are almost equal in importance.

A full breakdown of the relationships between the major oils and their principal usage is shown in Table VI. This analysis of the total supply, which includes butter, still further emphasizes the outstanding importance to the food industry of that major dairy product. It and lard account for about 65 per cent of the entire food-fat consumption of the country.

Acknowledgment—The tables and most of the information presented in the text of this article are interpretations of or excerpts from a recent report made recently by the Tariff Commission to the U. S. Senate in response to a resolution passed late in the previous Congress. The author and FOOD INDUSTRIES both take pleasure in acknowledging this source of the extremely valuable data which have resulted from the Commission's study.

Table VI—Apparent Consumption of Oils by Principal Industries

(Data in thousands of pounds for the operations of the calendar year 1929, the latest for which industry reports have been rendered)

Oil	Total Apparent Consumption (1)	—Reported Consumption in Principal Industries— Lard Compound or Substitute Industry	Margarine Industry	Other Food Industries or Food	Soap Industry	Paint and Varnish Industry	Balance of Consumption in Miscellaneous Industries, Households, and the Like
Primarily domestic materials							
Butter	2,177,297	.....	.....	2,177,297	.....	.....	.....
Lard (except neutral)	1,725,164	.....	.....	1,725,164	.....	.....	.....
Lard (neutral)	47,312	23,123	24,189	.....	.....	.....	.....
Oleo oil and animal fats	124,432	77,247	47,185	.....	.....	.....	.....
Tallow, inedible	839,018	.....	.....	.....	434,755	.....	183,747
Greases		.....	.....	.....	245,516	.....	
Cottonseed oil	1,474,006	1,083,202	28,173	350,631	12,000	.....	.....
Cottonseed-oil foots	108,904	.....	.....	.....	108,904	.....	.....
Corn oil	138,434	.....	.....	133,070	5,000	364	.....
Peanut oil	(2) 17,307	.....	6,617	8,990	1,700	.....	.....
Primarily imported materials							
Sesame oil	30,076	5,215	.....	20,026	4,835	.....	.....
Coconut oil	662,007	20,000	171,411	53,598	344,205	.....	72,793
Palm-kernel oil	84,327	.....	15	11,392	72,920	.....	.....
Palm oil	230,980	1,191	1,349	.....	192,331	.....	36,109
Olive oil, inedible and foots	54,808	.....	.....	.....	53,629	.....	1,179
Perilla oil	5,574	.....	.....	.....	.....	5,508	66
Soybean oil	(3) 19,359	82	11	.....	6,400	5,815	7,051
Olive oil, edible	91,836	.....	.....	91,836	.....	.....	.....
Tung oil	115,721	.....	.....	.....	.....	88,386	27,335
Rapeseed oil	16,848	.....	.....	.....	.....	.....	16,848
Both domestic and imported materials							
Fish oils	94,010	14,921	.....	.....	63,443	10,602	5,044
Whale oil	71,473	809	.....	.....	70,664	.....	.....
Linseed oil	787,680	.....	.....	.....	1,916	(4) 340,166	(5) 445,598

(1) Total apparent consumption represents n most cases the reported production plus imports (for consumption) less exports, plus or minus the differences in stocks on hand at beginning and end of year. Where the figure thus computed was less than the consumption reported by the above industries, the total reported by these industries has been substituted as the "apparent consumption." The basic data come from the Bureau of the Census and estimates by the trade.

(2) Includes some imported oil.

(3) Includes some domestic oil, but does not account for difference in stocks at beginning and end of year.

(4) Factory consumption only.

(5) The bulk of this probably used by painters for mixing and not included in factory consumption.

▼

Survey of Food-Freezing Research

RESEARCH by various agricultural experiment stations into the freezing of foods shows interesting possibilities, a preliminary survey by the Frozen Foods Association discloses. Objectives are to learn the best suited varieties and to study delicate, highly flavored, non-shippable fruit possibilities.

Growers of unusual subtropical fruits in Florida may yet ship their produce to Northern states as the result of tests by the Agricultural Experiment Station at Gainesville. This station has a well-equipped freezing plant where it has been investigating papayas, guavas, sand pears, avocados, youngberries, strawberries, orange juice and other products.

Year-round operation and consequent reduction in equipment and fixed charges are probable developments for producers of cranberry sauce on Cape Cod, as indicated by work at Massachusetts State College, at Amherst. Part of the cranberry crop is already being frozen and stored for canning out of season, several thousand barrels being preserved in this way. Done on a sufficiently large scale, it will permit operations of plants on a uniform production schedule throughout the year, instead of the usual brief season. The station has also frozen raspberries, peaches, blackberries, 30 varieties of strawberries, cherries, plums, nectarines, rhubarb, dates and pineapples.

Freezing of cider is being studied by the Minnesota Agricultural Experiment Station. Considerable work has been done there also with rhubarb, raspberries, strawberries, plums, peas and corn.

Fresh sweet corn may be available long after the "frost is on the pumpkin" when the North Dakota station, at Fargo, conquers the difficult task of freezing it properly.

"To ascertain what varieties of fruits and vegetables are most suitable for freezing" is the chief object of research by the New York station, at Geneva. Much of it has been done in cooperation with the Birdseye Packing Co., but some is independent enterprise. Equipment includes three cold-storage rooms for temperatures from +15 deg. F. to —45 deg. F.

The work of the Frozen Pack Laboratory of the Bureau of Plant Industry, at Seattle, is being continued. Projects there include a study of containers for frozen foods and methods of packing.

ABSTRACTS OF CURRENT LITERATURE

ASSIMILATION OF ALUMINUM BY THE HUMAN SYSTEM. S. D. Lewis. *Biochemical Journal,* Vol. 25, pp. 2162-2167; 1931.

Experiments show that normal blood usually contains no aluminum, and when it does contain any, the proportion is very small. A considerable quantity of aluminum is found in the blood of the same person after feeding with even one meal of aluminum-containing food. Further work on this subject is of great physiological interest.

* * *

THE DISTRIBUTION OF THE VITAMIN B COMPLEX. III—FRUITS. M. H. Roscoe. *Biochemical Journal,* Vol. 25, pp. 2050-2055; 1931.

The vitamin B_1 content of the orange was the highest of the fruits tested, being one-fifth that of yeast (dry weights) and equal to that of the green-leaf vegetables or liver. The value of tomato was rather less than one-tenth that of yeast; banana, one-twentieth; and apple still lower. The vitamin B_2 content of the fruits tested was lower. A large number of the foodstuffs tested had the same proportion of vitamin B_1 to vitamin B_2 as had yeast. Liver, meat, the green-leaf vegetables and egg yolk were richer in vitamin B_2 than in vitamin B_1, while the reverse was true of wheat germ, orange and the whole cereals.

* * *

RANCIDITY. II—KEEPING QUALITIES OF SHORTENINGS AND CRACKERS. H. O. Triebold and C. H. Bailey. *Cereal Chemistry,* Vol. 9, pp. 91-106; March, 1932.

Tests have shown that a refrigerator temperature of 10 deg. C. decreased the tendency of the shortening to become rancid, but was not nearly as effective as the exclusion of air. Iodine numbers of shortening do not appear to be related to keeping qualities. Crackers stored in carbon dioxide gas become rancid as quickly as when stored in air. Reheating crackers for five-minute intervals at 400 deg. F. for crisping was found to accelerate markedly their oxidative deterioration.

* * *

BACTERIA IN FROZEN FOOD. S. C. Prescott, P. K. Bates and M. E. Highlands. *American Journal of Public Health,* Vol. 22, pp. 257-262; March, 1932.

Experiments indicate that frozen food, if carefully prepared and stored, can be merchandised with an adequately low microorganism content. Fluctuations were noted at all storage temperatures. In certain foods such as orange juice, strawberries and lamb chops, the decreases in numbers of bacteria occur more rapidly and to a greater degree at the higher storage temperatures (—6.6 and —4 deg. C.). This may be due to the lack of the protective action of extreme cold (—18 to —29 deg. C.) against the unfavorable environment provided the organisms by the foods.

INVESTIGATION OF THE PROCESS OF VAPORIZATION. M. Jakob and W. Fritz. *Forsch. Gebiete Ingenieurw.,* Vol. 2A, pp. 435-447; 1931. [*Chemical Abstracts,* Vol. 26, p. 1679; March 20, 1932.]

The process of vaporization from flat surfaces was studied in three ways: direct observation, temperature measurement for the differences between the liquid and vapor temperatures, and examination of the heat transfer from the heating surface to boiling water. The heat-transfer coefficients for flat surfaces vary from 650 to 4,000 kg. cal./sq.m./hr./degree, where the total load is between 250 and 43,000 kg. cal./sq.m./hr. Above a total of 2,000 kg. cal./sq.m./hr. the value of the coefficient is nearly constant.

* * *

TESTING OILS WITH A PIECE OF SILVER, OR THE COIN TEST. R. Marcille. *Bull. mat. grasses inst. colonial Marseille,* Vol. 15, 109-112; 1931. [*Chemical Abstracts,* Vol. 26, p. 1815; March 20, 1932.]

In order to settle the question as to whether a positive coin test indicates that an olive oil has been adulterated with oil of marc of olives, the following experimente were made. A number of oils were heated with a bit of silver foil to 115-120 deg. C. for 24 to 48 hours. Peanut, cottonseed, turnsole and super-refined olive oil did not show any blackening of the silver. Rape oil and some refined olive oils gave a slight test, while refined sulphurated oils gave an intense blackening. An addition of 5 per cent of these latter oils to olive oil could easily be detected. It was shown, however, that pure olive oil in contact with hydrogen sulphide or sulphates gradually absorbs sulphur chemically and acquires the ability to give a positive coin test. For this reason an olive oil cannot be declared adulterated with oil of marc of olives solely on the basis of a positive coin test.

* * *

OCCURRENCE AND DETERMINATION OF ALUMINUM IN FOODS. I—DETERMINATION OF ALUMINUM IN ORGANIC MATERIALS. II—ALUMINUM CONTENT OF FOODSTUFFS COOKED IN GLASS AND IN ALUMINUM. G. J. Cox, G. D. Beal and others. *Industrial and Engineering Chemistry,* Vol. 24, pp. 403-407; April, 1932.

Aluminum in organic tissues is determined colorimetrically as a lake with aurin tri-carboxylic acid. Exact details of the procedure are given. Foods cooked in glass and in aluminum have been analyzed for aluminum, and the average increase has been calculated. The taking up of aluminum by neutral foods is negligible; acid and alkaline foods are relatively more corrosive. In no case, however, is sufficient aluminum dissolved from utensils to interfere seriously with phosphorus absorption. An average daily intake of aluminum in case all foods are cooked in aluminum is estimated at 12 mg., of which about 5 mg. is derived from the utensils.

DETECTION OF TIN SOLDER CAUSING DARK DISCOLORATION IN CHEESE. W. L. Davies. *Analyst,* Vol. 57, pp. 95-96; February, 1932.

Metals likely to get into cheese during manufacture are tin, lead, iron and copper. The presence of copper is shown by the formation of a strong green halo round the particle. A simple test for solder which is described is based on the sensitive "molybdenum blue" test for tin. If tin is present, an intense blue color develops, while cheese not contaminated in this way does not develop any blue color.

* * *

CORROSION OF METALS BY MILK. H. A. Trebler and others. *Industrial and Engineering Chemistry,* Vol. 24, pp. 339-350; March, 1932.

The corrosion of nickel, copper, nickel-silver, an experimental chromium-nickel alloy, and a chromium-nickel-iron alloy in sweet milk was studied. In milk being heated to the pasteurizing temperature and held at that temperature, nickel was corroded only slightly. The dual effect of high aeration and high velocity in increasing the rate of corrosion under certain conditions and decreasing the corrosion rate by accelerating protective-film formation under other conditions, accounted for the difficulty in applying the results of former investigations to explain the practical behavior of nickel in milk. Nickel-silver showed somewhat the same behavior as nickel, but copper was not noticeably protected on heating. The chromium-nickel alloy was resistant under all conditions, as was the chromium-nickel-iron alloy. Galvanic corrosion, due to differences in metal operation or temperature, was unimportant, as also was the metal content of the milk. The manufacturer and operator can use nickel with assurance in the larger part of pasteurizing equipment and avoid the difficulties which would be associated with its use in the particular pieces of equipment where corrosion is appreciable.

* * *

INHIBITION OF MOLD GROWTH ON MEAT BY CARBON DIOXIDE. T. Moran, E. C. Smith and R. G. Tomkins. *Chemistry and Industry,* Vol. 51, pp. 114-116 T; April 8, 1932.

Experiments show that a concentration of 10 per cent carbon dioxide slows down the growth rate of *Thamniduum* mold in the early stages to one-half, and that 20 per cent carbon dioxide effects, for all practical purposes, complete inhibition of the mold growth on lean meat. Inhibition of growth on connective tissue and fat is well evident on both inner and outer surfaces.

* * *

THE SURFACE CHANGES IN CANDIES DUE TO RECRYSTALLIZATION. F. Halla and E. Mehl. *Listy Cukrovar.,* Vol. 50, pp. 144-146; 1931. [*Chemical Abstracts,* Vol. 26, p. 1990; April 10, 1932].

Candy containing hyaline sugar retains a luster for a long time if wrapped and protected from water. In air a change begins on the surface and extends to the center of the lumps; the candy loses fragility and softens. This change is due to moisture in the air and hygroscopic acids in the candy. Experimental evidence indicates that crystalline sucrose is formed.

BOOK REVIEWS

REFRIGERATING DATA BOOK AND CATALOG. First Edition. David L. Fiske, Editor. Published by the American Society of Refrigerating Engineers, 37 West 39th St., New York, N. Y., 1932. 562 pp., 6½x9¼; illustrated; flexible. Price, $3.50 in U.S.A.; $4 elsewhere.

A REFERENCE book for the plant engineer, this collection of chapters by eminent engineers deals with the various phases of refrigeration. It is the first of a series of engineering handbooks to be published biennially.

The six main divisions of the contents—known as sections—embrace individual chapters on such general phases as fundamental data, fundamental principles, refrigerating machinery, insulation and containers, refrigerating equipment and applications. Of special interest to engineers in food plants are the chapters on food properties, air conditioning, cold storage, freezing of foods, dairy products and ice cream. Several other chapters are of as great importance, though less direct, to engineers in the food field. Each chapter includes a list of references to sources of further information as well as factual information combined with the criticism and opinion of the author.

The value of this volume as a reference book is increased by its glossary of refrigerating terms, tables of refrigerating conversion data, and statement of the safety code for mechanical refrigeration.

* * *

THE IRON CONTENT OF VEGETABLES AND FRUITS. By Hazel K. Stiebling, Senior Food Economist, Bureau of Home Economics. Published by U. S. Department of Agriculture, Washington, D. C., February, 1932. 20 pp., 6x9; paper. Price, 5 cents (Superintendent of Documents).

IT HAS been frequently pointed out that the much needed iron content of a diet can be obtained from fruits and vegetables without an appreciable increase in protein or fuel value. However, few systematic, and, until the author undertook such a study in 1929, no specific research studies had been made of the iron content of the common fruits and vegetables.

The author analyzed 237 specimens of 82 different forms, parts, or varieties of vegetables and fruits and has classified them according to the quantity of food iron they contain. Of 98 fresh fruits and vegetables studied, the author classes 17 as "excellent," 24 as "good," 44 as "fair," and 13 as "poor" sources of food iron.

On the whole, vegetables outrank the fruits and fruit juices in iron content, but many of the fruits are "good" and "fair." The thin-leaved greens, such as spinach, turnip tops, dandelions, and kale, are conspicuous for their iron value; lima beans, cowpeas, English garden peas, and vegetable oyster or salsify, are also "excellent." Of chief importance in the group designated as "good" sources are potatoes and thick pigmented stalks and leaves, such as red or green cabbage, cauliflower, brussels sprouts, broccoli, asparagus, and several fruits, including blackberries, blueberries, raspberries, quinces, and Concord grape skin. Approximately half the group called "fair" consists of fruits; the rest are vegetables with edible seed pods, blanched leaves, blanched leafstalks, roots, and bulbs.

Citations to existing literature on the subject are included.

* * *

THE VITAMINS. By H. C. Sherman and S. L. Smith. Second Edition. A.C.S. Monograph No. 6. Published by the Chemical Catalog Co., Inc., 419 Fourth Ave., New York, N. Y., 1931. 575 pp., 6¼x9¼; illustrated; cloth. Price, $6.

IN THE ten years that have intervened since the first edition of this monograph appeared, voluminous information regarding vitamins has been published. Even to the most ambitious student the task of searching out that information would be very laborious. To read and study all of it would be impossible for one wishing to make practical use of the knowledge it contains.

For the benefit of all classes of readers the authors have summarized the more important information regarding each vitamin in separate chapters and have so developed the subject matter of each of the seven chapters that the monograph is as valuable to food manufacturers and their technologists as to nutrition workers, physicians or teachers.

Each of the six vitamins is discussed relative to physical properties, chemical nature as far as was known in 1930, biological relationships, natural sources, distribution in foods, and other aspects of more specific interest to nutrition workers and investigators. The first chapter is quite short, but gives the lay reader a general introduction to the vitamin theory and briefly reviews the history of vitamin terminology.

Of particular interest to all readers of vitamin literature is the comprehensive 183-page bibliography which contains references to practically all important vitamin literature. In it, the literature is classified alphabetically according to authors. When the contribution has joint authorship, the listing is under the senior author. However, its contents are fully brought out in the author and subject indexes, which cover the contents of the seven chapters as well as the bibliography.

* * *

UNEMPLOYMENT INSURANCE IN GREAT BRITAIN. By Mary Barnett Gilson. Published by Industrial Relations Counselors, Inc., New York, N. Y., 1931. 560 pp., 6x9; 12 charts, 48 tables; cloth. Price, $5.

WHATEVER may eventually be done in the United States to alleviate the miseries of recurrent unemployment, technological or otherwise, it has become increasingly apparent during the past two years that some systematic measures must replace the hit-or-miss methods that have so far been used. It is with this viewpoint that Industrial Relations Counselors, Inc., is publishing a series of volumes dealing with unemployment relief, of which this is Volume II. The first volume dealt with unemployment benefits that have been tried out in the United States. The current volume deals with the unemployment insurance system that is used in Great Britain. Future studies will cover unemployment insurance in Switzerland, Belgium, and Germany.

In this country we have a habit of dismissing the British system contemptuously with the word "dole," without in the least knowing what that system is or how it works. Actually, the British system is the opposite of a "dole," being an insurance plan based on a fund made up of contributions from the workers, the employers, and the government, to which fund the workers contribute, according to the law, the greatest part.

The unemployment emergency has been so severe, however, that the fund has run short a number of times in the last ten years. Because of this, the government has lent money to the fund. Also, amendments have been made to the enabling act (Act of 1920) to meet the necessities of the unemployment situation.

The author gives in her work a careful, impartial account of the operation of the British system and, in appendixes, describes the several employment insurance schemes operated in Britain by large concerns that do not come within the scope of the British government insurance.

This book, and its companion volumes, will be of real help to those who must soon act to bring order to the present chaotic and piddling methods of dealing with unemployment in the United States.

G. L. MONTGOMERY.

* * *

Books Received

DAIRY BACTERIOLOGY. By Orla-Jensen. P. Blakiston's Sons & Co., Philadelphia, Pa.

COLLOID CHEMISTRY, Vols. 3 and 4. By Jerome Alexander. Chemical Catalog Co., New York, N. Y.

MARGARINE AS A BUTTER SUBSTITUTE. By Katherine Snodgrass, Food Research Institute, Leland Standford University.

INTERNATIONAL UNEMPLOYMENT. International Industrial Relations Institute, The Hague, Holland.

ECONOMICS IN FOOD CONSUMPTION. By Edith Hawley. McGraw-Hill Book Co., New York, N. Y.

NUTRITION AND PHYSICAL FITNESS. By L. Jean Bogert. W. B. Saunders Co., Philadelphia, Pa.

THE CHAIN STORE—BOON OR BANE. By Godfrey M. Lebhar. Harper & Brothers, New York, N. Y.

CORN AND HOG SURPLUS IN THE CORN BELT. By Alonzo E. Taylor. Food Research Institute, Leland Stanford University.

MARKET AGRICULTURAL PRODUCTS IN THE UNITED STATES. By Fred E. Clark and L. D. H. Weld. The Macmillan Co., New York, N. Y.

THE BUSINESS PAGE

New Federal Taxes Affect All Food Industries

Profits may be trimmed a little closer to the "red" in the candy, chewing gum, brewing, grape concentrate, and soft-drink industries between now and July 1, 1934, by the special levies of the Revenue Act of 1932. And manufacturers who escaped the special taxes have plenty to worry about in the levies that will fall indirectly on their business.

The special taxes affecting food industries include: brewer's wort, 15 cents per gallon; malt syrup and liquid malt, 3 cents per pound; grape concentrate and evaporated grape juice, 20 cents per gallon; flavoring syrups, 5 cents per gallon; fountain syrups, 6 cents per gallon; carbonic gas, 4 cents per pound; mineral waters, 2 cents per gallon; still drinks, 2 cents per gallon; cereal beverages, 1¼ cents per gallon; fruit juice beverages (tomato juice is not included), 2 cents per gallon; chewing gum, 2 per cent; candy, 2 per cent.

Taxes falling indirectly on food industries are: mechanical refrigerators, 5 per cent; lubricating oil and "grease," 4 cents per gallon; gasoline, 1 cent per gallon; automotive trucks, 3 per cent; passenger automobiles, 4 per cent; tires, 2½ cents per pound; tubes, 4 cents per pound; telephone messages costing 50 cents to $1, 10 cents; $1 to $2, 15 cents; over $2, 20 cents; leased wires, 5 per cent; cablegrams, 10 cents; bank checks, drafts and money orders, 2 cents; first class postage, 3 cents, with a corresponding increase in second class rates; corporation incomes, 13¾ per cent; capital stock and bond issues, 10 cents per $100 of par value.

All of these levies went into effect June 21, with the exception of the new postage rates, which are effective after July 6.

Market Prices Stiffen

As Congress jockeys for political advantage before adjournment and political leaders steam-roller their slates through nominating conventions, business relaxes into midsummer inactivity.

Although the national budget is theoretically balanced, general business conditions, indexed by THE BUSINESS WEEK, declined from 58 per cent of normal to a new low of 55.5 per cent between May 14 and the week ending June 18, in the face of a stiffening commodity market.

A weighted price index gives increases of 0.35 per cent in all commodities and 7.0 per cent in food prices on June 25, as compared with May 21. U. S. Department of Labor reports decreases in wholesale prices of ⅛ of one per cent in all commodities and 3.6 per cent in food for the four-week period ending June 18.

A further shift in consumer buying is indicated in A. & P. tonnage sales for May, which were only 1.3 per cent below those for May, 1931. This decrease is only 82.5 per cent as great as that reported for April.

Basis for the Curves

Retail food prices, factory employment, factory payrolls and wholesale prices are based on indexes of the Department of Labor. Cost-of-living index is that of the National Industrial Conference Board. Electrical power consumption figures are furnished by *Electrical World*.

Tax-Administration Clauses Explain Certain Levies

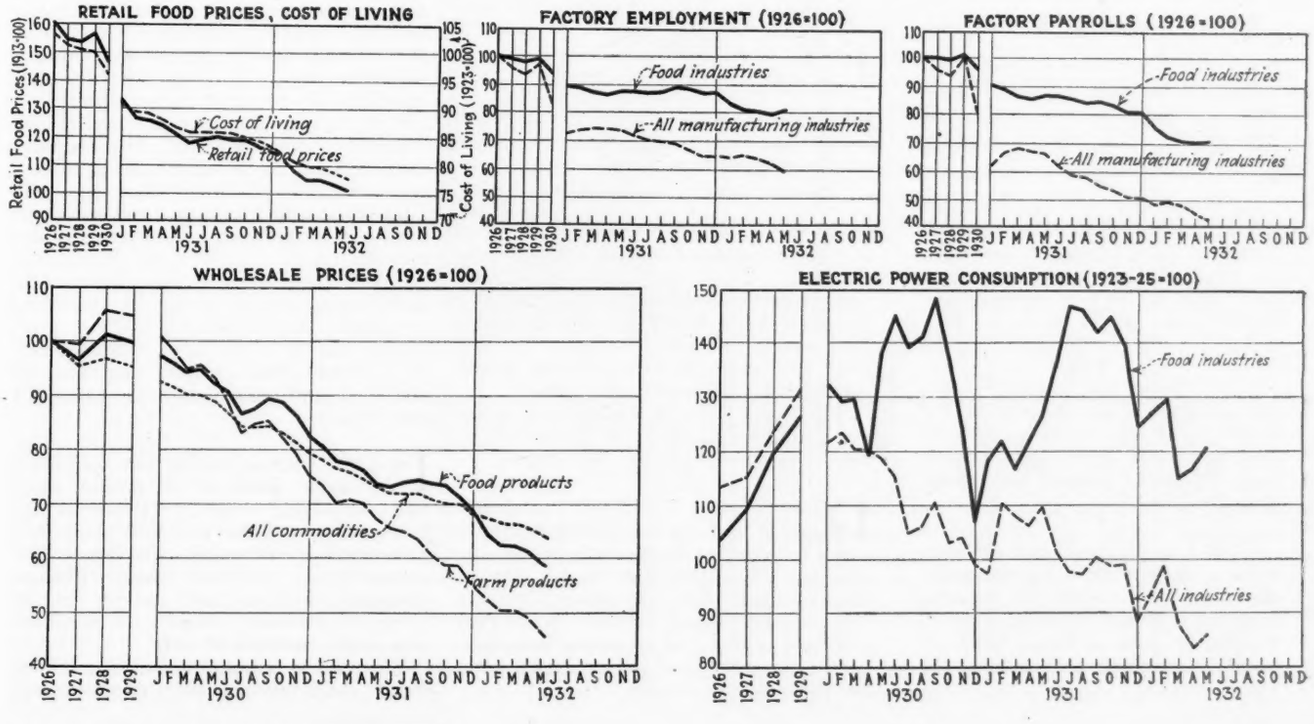
No matter if it is candy-coated and is supposed to have medicinal value, it's still chewing gum and is taxable as such, provisions for the administration of the new taxes hold. Somewhat more leniency is exercised in the case of candy, the ruling being that the tax on candy does not apply to confections such as cakes and pastry, bitter chocolate which needs the addition of sugar to make it pleasing to the taste, powdered chocolate, or marshmallow paste.

Rules regulating payment of the taxes require that returns be filed and payment be made no later than July 31. The period covered by the first returns and payments is that between the effective dates of the taxes and June 30, 1932. Subsequent payments will be made monthly. Soft-drink manufacturers are required to register each year on or before July 1.

Exemption to the excises is made when the articles to be taxed are sold to be used in the manufacture of a taxable article or as a part of it, except for tires. Motor-driven vehicles used to draw other vehicles in a factory are also exempt.

Butter Lowest Since 1898

Not in 34 years has the price of 92-score butter been lower than on June 20 and 27, when it fell to $0.16 per pound. Unwillingness of buyers to cover their normal requirements with cold-storage stocks, despite holdings below the five-year average, is ascribed as the principal cause. Unless unusual rainfall keeps the pastures green all summer, the probable effect of the continued decline will be the culling of herds to send many old cows to slaughter.



THIS MONTH—

JULY

11—Glass Bottle Blowers' Association of the United States and Canada, biennial meeting. Harry Jenkins, secretary, 1010 Colonial Bldg., Philadelphia, Pa.

11-16—Second Conference on Smaller Industries, Silver Bay, on Lake George, N. Y.

12-14—National Confectionery Salesmen's Association of America, Atlantic City, N. J.

13—National Kraut Packers' Association, Pittsburgh, Pa.

18-23 — International Congress for Scientific Management, Amsterdam, Holland.

—National Syrup and Molasses Association, mid-year meeting, Atlantic City, N. J. George P. Williams, secretary, Box 149, Kansas City, Mo.

Hors d'Oeuvres

NOW we know why veterans of the B.E.F. have not starved. Their leader, W. W. Waters, is reported to be a former cannery superintendent at Portland, Ore., and one-time assistant superintendent of the now-defunct Wenatchee Canning Co., Wenatchee, Wash.

•

GREEN WRAPPING of a grassy hue, science finds, is better than the much-ballyhooed transparent jackets for oil-bearing foods. It delays development of rancidity by excluding photochemically active light rays. Black acts the same way.

•

ANOTHER DISH for the Dutchman. Yes, it's sauerkraut—made from turnips. The flavor of the new "kraut" is said to resemble the cabbage variety. To make it, grind the roots, mix with salt, and pack in weighted stone jars.

•

THAT steadfast enemy of the cotton grower, the boll weevil, may prove his best friend this year by creating a shortage that will boost prices. Should the government have gone in for bug breeding instead of farm boards?

•

DRY AMERICA'S famous appetizer—tomato juice—is taking the place of more sparkling beverages on the Englishman's menu. Practically unknown in Great Britain six months ago, it is gaining favor rapidly.

•

THE Greeks have a date for it—embossed in Arabic figures in the metal of the can. All canned foods sold in Greece after Oct. 1 must bear the date of packing and release from the plant.

•

HUMAN BEINGS can do four times as much work in a temperature of 100 deg. F. when the relative humidity is 30 per cent than when it is 100 per cent, and can work at maximum efficiency only between 40 and 75 deg. F.

What Food Men Are D

Canning Standards Revised—Packers Plan

Bolt Hearing—Confectioners Bur

Restrictions on Nuts —A

"BELOW U. S. Standard, Good Food, Not High Grade," will appear in distinctive type on substandard canned fruits after Aug. 23. Substandard canned vegetables, however, will carry the usual label, "Below U. S. Standard, Low Quality But Not Illegal." These are requirements of revisions under the McNary-Mapes Amendment signed May 25 by Secretary of Agriculture Hyde.

The new rules also change the standard-fill specifications. Canned food is now of standard fill "when neither the headspace nor the amount of water, brine, sugar solution, or other packing medium is excessive." In general, excessive headspace exists when the distance from the bottom of the cover to the highest point of the product exceeds 10 per cent of the inside height of the container. When only the headspace is excessive, the legend, "Below U. S. Standard," is accompanied by the explanatory statement, "Slack Fill." If there is an excess of packing medium, whether or not the headspace is excessive, the supplementary legend comprises "Slack Fill" on one line, and "Contains Excess Added Liquid" on the line below.

Changes were made also in the previously announced standards for canned peas, peaches, pears, apricots, tomatoes and cherries.

FRUIT AND BERRY packers in Washington and Oregon are determined to shape 1932 operations and relationships with distributors in such a way that their packs will be consumed at reasonable prices.

To accomplish this, production and merchandising are to be kept on a sound basis by educating individual units to the importance of cooperation and by supplying them with daily production and merchandising records for the group. The data will show each packer how much of each commodity he can pack with safety and will prevent foolish mistakes in production and sales.

This plan is being carried out under the management of E. M. Burns, secretary, Northwest Canners' Association.

DOMESTIC CASEIN producers walked out on the Tariff Commission, June 10, at its hearing on the application for a reduction in the duty on casein, made by Argentine interests. The Commission's refusal to disclose evidence on the cost of producing casein in this country and the Argentine was the cause of the trouble.

In 1930, a tariff of 5½ cents a pound was placed on casein, and domestic interests maintain the levy is none too high. To prove their point they state that Argentina has been selling ground casein c.i.f. New York at as low as 1.56 cents a pound and that to produce it in this country costs from 7½ to 10 cents a pound.

NO AGREEMENT has been reached on a uniform method of handling the 2 per cent tax in the confectionery industry. It is generally conceded, however, that the manufacturers can't absorb the levy without raising prices, if they expect to survive.

In regard to the price advances necessary to take care of the nuisance-tax burden, Arno E. Sander, National Confectioners' Association president, says, "The consensus of opinion is that the advances will approximate 2½ cents per box on bar goods selling for less than 60 cents per box and that sizes and weights should be adjusted on all present 60-cent goods. On bulk sales of all varieties, advances of ¼ to ½ cent per pound will be necessary."

MAYONNAISE manufacturers apparently are far from satisfied with the government's revised standards for their product. At any rate, 18 of 20 reporting to the Mayonnaise Manufacturers' Association favored the old standard. It required 78 per cent of oil and egg yolk; the revised one, 50 per cent of vegetable oil. The general opinion of the industry is that the government has left the door open for a lot of inferior products. Nevertheless, the revised standards will be given a six-months' trial.

Commercial production of mayonnaise and related products by 78 reporting companies was 19,471,037 gal. in 1931, an increase of 6.6 per cent. Salad dressing showed the greatest increase, 31 per cent, and mayonnaise increased 1.4 per cent.

IMPORTERS of edible nuts gathered *en masse*, June 14, to protest adoption of more severe restrictions on foreign nuts. The Food and Drug Administration proposed to lower the tolerances on cashews, Brazils, filberts, chestnuts, and walnuts and to discontinue conditional releases of detained lots of all varieties of nuts.

Through a committee of the Dried Fruit Association, the importers op-

Doing and Saying

Plan Production—Casein Producers Burdened by Tax—Propose —All Crops Smaller

posed lower tolerances on the ground that they would make for hardship on the industry during years when the natural condition of the nuts was only average. As for discontinuance of releases, they pointed out that the expense of reexporting one shipment might wipe out profits for several years.

EMPLOYMENT for some 10,000,000 additional workers, or the entire army of idle, would be provided if every employer could follow the example of the Owens-Illinois Glass Co., Toledo, Ohio, and be able to sell its products. This concern recently inaugurated an operating schedule by which it expects to increase its personnel by one-third, making the total 8,000, the requirement for normal times.

Under the new system, employees in each of the company's fourteen plants will work in six-hour shifts, seven days a week, and the plants will operate 24 hours a day.

PRODUCTION of edible crops for 1932 will be considerably less than normal, with few exceptions. In ten southern potato-growing states the condition of the crop as of June 1 was 67.3 per cent of normal, while from the Southwest comes a report that rice acreage has been reduced 25 per cent in Louisiana and Arkansas and 10 to 15 per cent in Texas.

California's almond crop, incomplete surveys indicate, will be 63 per cent of normal, as against 82 per cent last year. In Spain and Italy, however, the almond production is expected to surpass last year's. California is low also in spinach, the 1932 pack being 809,885 cases, as against 1,339,700 in 1931.

Fruits and berries probably will be shorter than any of the other crops. The crop condition for the entire country as of June 1 for peaches was 51.7 per cent of normal; pears, 57.6; and apples, 58.5. In 12 states, the condition of cherries was 67.9. California reports 28,000 tons of apricots, compared to 37,359 in 1931; 160,000 tons of prunes, against 198,289 last year; but 215,000 tons of raisins, compared to only 171,500 a year ago. In the Northwest, the prune crop is expected to be only 25 to 30 per cent of normal. Also from the Northwest comes word that berry packs are to be drastically curtailed by a schedule which calls for entry into 1933 without carryover.

Optimism is found in the pickle industry over a 62 per cent reduction in acreage, as compared to 1931, and over a consumption increase of 12,000 bu. for the first quarter of the year as compared to the same period of 1931.

Production prospects of important grains as of June 1, in percentages of normal, are: winter wheat, 64.7; durum wheat, 87.4; all spring wheat, 84.5; oats, 78.9; barley, 82.3; and rye, 80.4. Developments during the past month point to a lower figure for wheat than that of June 1.

Some relief in the sugar situation is seen in Cuba's resolution to reduce next year's production by a schedule based on this year's shipments and a carryover. The 1933 crop will be 1,700,000 tons, assuming an export of 1,800,000 tons to the United States this year.

Sardine packing in Southern California is one industry showing an increase, the pack being 789,455 cases for the season just closed, as against 741,060 in 1931.

It didn't take long for this milk man to fall in love with the new, light aluminum can, for it's a back saver. These cans are made in 5, 8 and 10-gal. sizes which are from 4 to 10 lbs. lighter than the regular cans.

SCHEDULES for reporting canners' and distributors' stocks of pears, corn, tomatoes, green and waxed beans, peaches, pears, pineapple and salmon as of July 1 have been sent out by the Department of Commerce in connection with the Quarterly Canned Foods Stock Surveys.

—AND THE NEXT

AUGUST

9-12—International Apple Association, annual meeting, Waldorf-Astoria, New York, N. Y.

11—National Malt Products Manufacturers' Association, quarterly meeting, Hotel Sherman, Chicago, Ill.

24-31—International Congress of Genetics, with plant and animal exhibits, Cornell University, Ithaca, N. Y.

25—American Cranberry Growers' Association, semi-annual meeting, Log Cabin Lodge, Medford, N. J.

27-Sept. 10—Sixth International Congress of Refrigeration, Buenos Aires, Argentina.

—Western Confectioners' Association semi-annual meeting, Palace Hotel, San Francisco, Calif.

Concentrates

Meat packers have been granted until June 15, 1933, to dispose of their stocks of unrelated products . . . Ice cream manufacturers have adopted as standards the ⅛-, ¼-, ½, 1- and 2-pint cups . . . The average Canadian ate 57.94 lb. of beef, 83.49 lb. of pork, and 7.03 lb. of mutton and lamb last year . . . Trucks get only 75 per cent as much mileage from tires when they are operated at 50 miles per hour as when the speed is 30 miles per hour, a U. S. Rubber Co. official states . . . Bags of flour should be loaded into a freight car in brick-wall style rather than in pyramid formation, railroad representatives told millers in Buffalo . . . It cost, on the average, 81 cents to produce a bushel of wheat in 1931, but the average price to the farmer was only 47 cents . . . By a new government process, sweet potatoes may be made into a starch which equals the imported, high-quality, white-potato product for textile purposes . . . Extremely inexpensive sugar for use in the manufacture of alcohol is being made from sawdust (wood cellulose) by a company in Hamburg, Germany . . . For the first time in more than twelve years, Florida is permitting oranges from California, its rival in citrus fruit production, to enter the state; a shortage is the cause of the condescension . . . Over a billion pounds of coffee in 7,786,000 bags was destroyed by Brazil during the year ending June 18 . . . In a demonstration at Ohio State University, a shrinkage of only 6 per cent was produced in beef roasted at 250 deg. F., but the shrinkage was five times as great when the temperature was doubled . . . A large creamery in the region of Devil's Lake, N. D., is reported to be renting refrigerating compartments to farmers for storing their beef during the summer . . . The ten Northern states which produce 73 per cent of the factory butter output consume 46.5 per cent of the margarine supply, while the ten cotton states consume only 12.9 per cent of it . . . Coffee drinkers throughout the world are consuming approximately five per cent less coffee this year than last . . . Hydrocyanic acid gas has been used successfully for killing rats on ships without injuring fresh foods on board.

TRADE NOTES

ATLANTIC SOUTHERN FOODS CO., has recently been formed in Atlanta, Ga., by Fred A. Woleben to sell and distribute frozen foods in the South and to operate a plant for the quick-freezing of fruits and vegetables.

CANNING MACHINERY & SUPPLIES ASSOCIATION, Chicago, has announced that it will not hold its customary exhibit at the 1933 Canners' Convention. The company's annual meeting, however, will be held on Wednesday of the convention week.

CHASE & SANBORN lost priority rights to the coffee brand "Dining Car" to Norwine Coffee Co., St. Louis, Mo., by decision of the Customs Court. It was held that Chase & Sanborn had originally used the name as a grade mark and not as a trademark.

CLOVER FARMS STORES CORP., whose headquarters are at Cleveland, recently added southeastern Ohio and western West Virginia to its territory. F. J. Beasley Co., Athens, Ohio, will serve the new area.

THE CORN PRODUCTS REFINING CO. is developing a plantation of yucca in Santo Domingo for the production of tapioca. A commercially practicable yield of six tons of starch per acre has been obtained.

DRYICE CORPORATION OF AMERICA failed to secure a review of the decision of the Supreme Court stipulating that the term "Dry Ice" is not subject to be registered as a technical trademark for solid CO_2.

FROSTED FOODS SALES CO. has licensed Snider Packing Corp. to quick-freeze 15 cars of peas by the Birdseye process at its Albion (N. Y.) plant during July. Eight portable freezers will be used and the produce will supplement Frosted Foods' regular supply of quick-frozen foods. After July, the freezers will be moved to Seabrook Farms, Bridgeton, N. J., where about 15 cars of lima beans will be canned during August. These two canning jobs follow operations begun in March at Fairfax, S. C., where asparagus, strawberries, peas, stringless beans, and lima beans were packed. The company will quick-freeze about 6,000 tons of produce this season.

GENERAL MILLS, INC., has awarded certificates to 271 graduates of the ten-day short course on cakes sponsored by it and allied companies in Buffalo. Bakers from every state were among the group to take the practical training.

THE POPSICLE CORP., manufacturer of frozen suckers on sticks, has been denied the right to manufacture "milk popsicles" by decision of a Delaware district court. Suit was brought by Good Humor Corp. of America on grounds of infringement of the Burt patents for making frozen confections.

STANDARD BRANDS OF ASIA, INC., has been organized by Standard Brands, Inc., to consolidate and extend its business in Asiatic countries. Its activities will be directed through the head offices of Standard Brands of California.

TODDY, INC., division of Grocery Store Products, Inc., New York, is instigating a "drink more milk" campaign to combat the downward trend in milk consumption. The drive will be centered in a series of radio programs built around talks by national women leaders. Thirty-one stations will broadcast the talks.

UNIVERSITY OF MINNESOTA, dairy division, is offering three short courses in dairy manufacturing this year. The first, for creamery operators and managers, will be held Oct. 3-8; the second, for ice cream manufacturers, Nov. 10-19; and the third, the regular six weeks' creamery course, Jan. 5 to Feb. 16, 1933.

PERSONAL

ROSS E. ANDERSON, formerly production manager of Western Bakeries, Inc., Los Angeles, and past president of the American Society of Bakery Engineers, resigned recently and has joined General Mills, Inc., He will serve as a special General Mills products control representatve in Texas and Oklahoma.

C. L. ARNOLD, director of research for a number of years in Kroger Grocery & Baking Co., has been made head of the Kroger Food Foundation to succeed Dr. Ryan.

H. A. BENDIXEN, associate professor of dairy husbandry at the State College of Washington, Pullman, left June 16 for Europe, where he will complete a year's study under a grant of the Oberlaender Trust of Carl Schurz Memorial Foundation, Philadelphia.

S. E. COMSTOCK has been elected president of Snider Packing Corp. in conjunction with reorganization of the company. He succeeds James Moore, former president of National Canners' Association, retired. B. C. Olney was made executive vice-president.

L. T. DEE, former director of the Utah Canning Co., Ogden, has been elected president to succeed the late H. L. Herrington. R. B. Porter was elected vice-president.

G. H. EISWALD, president of Penick & Ford Sales Co., New York, a subsidiary of Penick & Ford, Ltd., manufacturers of molasses and corn products, resigned recently.

ROY E. GRAVES, who has been in charge of a Beech-Nut Packing Co. plant at San Jose, Calif., for nine years, accepted a position June 15 with California Prune and Apricot Growers' Association.

WILLIAM A. HEFLER, White House Bakeries, Inc., Boston, was chosen president of New England Bakers' Association at the organization's eleventh annual convention at Rockmere Hotel, Marblehead, Mass., June 19-21. H. D. Likins, Boston, was made executive secretary.

ROBERT C. HIBBEN, acting executive secretary of the International Association of Ice Cream Manufacturers for the past few months, has been appointed executive secretary.

A. H. ROSENFELD, consulting technologist of the American Sugar Cane League, recently sailed for Egypt, where he is to be sugar cane expert for the government.

CHARLES H. SWIFT has been elected chairman of the board of Swift & Co. to succeed his late brother, Edward F. Swift. The new chairman is the third son of Gustavus F. Swift, founder of the packing house. He is 54 years old.

DOUGLAS C. TOWNSON, president and treasurer of Curtice Bros. Co., has been placed on the board of directors of Snider Packing Corp.

LEONARD E. WOOD, vice-president and general manager of California Packing Corp., was recently made president of the organization, and R. M. Barthold, president, became chairman of the board, succeeding the late Robert I. Bentley.

OBITUARY

PHILIP BARTHOLOMAY, prominent New York brewer, died June 6 in Buffalo. He was a descendant of the founders of Bartholomay Brewery, Rochester, which was opened in 1840.

JAMES H. BRADY, 85-year-old fruit packer of Baltimore, who had been in the packing industry for more than 30 years, died June 13.

J. W. CARLYLE, head of the Crystal Dairy, Calgary, Alberta, and organizer of Jersey Farms, Ltd., Vancouver, B. C., died recently in Vancouver. Mr. Carlyle was one of the most promient men in the dairy industry in western Canada.

WILLIAM FREIHOFER, president and general manager of the Philadelphia baking company bearing his name, died June 26 after a four-months' illness. He was 74 and had spent his last 39 years in the baking business.

HERBERT LEE HERRINGTON, president and general manager of Utah Canning Co., Ogden, Utah, and committeeman of the National Canners' Association, died May 28 of heart disease. He was 62 years old. Mr. Herrington was the originator of Canned Foods Week.

CARL B. MUELLER, vice-president of Flour Mills of America and in charge of the New York office of the company, died June 22 after a heart attack. He was 43 years old.

JAMES F. MURPHY, 83-year-old president of Stickney & Poor Spice Co. and a pioneer of the Boston spice industry, died June 20. Mr. Murphy had been connected with Stickney & Poor for 40 years.

HUGH O'HARE, vice-president of the central division of Great Atlantic & Pacific Tea Co., died May 29 at the age of 48. Mr. O'Hare had been with A. & P. for 26 years.

FRANK PARROTT, 55-year-old president of the packing company bearing his name, Fort Wayne, Ind., died recently.

H. C. SORENSON, president of Gillette Canning Co., Gillette, Wis., and prominent in Wisconsin canning activities, died recently.

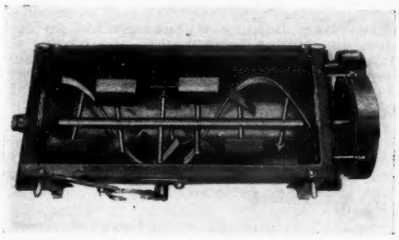
EDWARD VILLEROY STOCKHAM, retired army major and millionaire tomato packer of Perryman, Md., killed himself recently. Major Stockham was 69 years old and had spent 35 years in the tomato industry.

MICHAED J. WAGNER, retired co-founder of Martin Wagner Co., large Baltimore packing concern, died June 26 at the age of 75. Mr. Wagner is said to have been first to bring pineapples from the West Indies to Baltimore for packing.

NEW EQUIPMENT FOR FOOD MANUFACTURERS

Premelting of Shortening Eliminated by Mixer

Cold shortening may be mixed intimately with flour and other ingredients to produce a fluffy, lump-free product by the mixer announced by Robinson Manufacturing Co., Muncy, Pa., it is asserted. This machine is equipped with blades of the trowel type which are designed to simulate the action of a trowel in the hands of a skilled operator. In addition to the trowel



blades, the mixing agitator consists of the regular spiral conveyor and adjustable paddles. These keep the material moving back and forth continuously to facilitate rapid mixing and efficient operation, and they are so arranged a to direct the mixture to the outlet at the center of the mixing vat.

The elimination of premelting is listed as the chief advantage of the new mixer, since this enhances the keeping qualities of the prepared flour and does away with the use of heating equipment. Easy access for cleaning and sanitary construction, heavy enamel being used both inside and outside, is an additional advantage.

The machine is made in capacities ranging from 15 to 3,000 lb. per batch, the size of the motor required for the different sizes varying from a fraction to 20 hp. The time required to mix a batch is about 5 minutes. All kinds of shortenings, oils and other liquids may be mixed with flour and dry powders in the machine.

Trucks Refrigerated by CO_2 At Fixed Temperatures

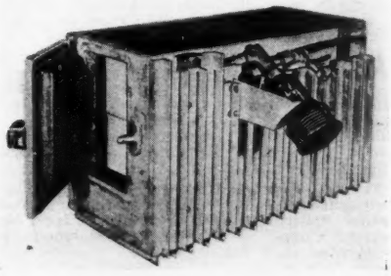
Better control of temperatures in refrigerated trucks is the reason for combining the use of solid CO_2 and methyl chloride as refrigerants in the refrigerated truck bodies recently developed by the York-Hoover Body Corp., York, Pa.

In this refrigerating unit, manufactured by the York Ice Machinery Corp., York, Pa., solid CO_2 acts as the primary refrigerant and the methyl chloride as the secondary. The solid CO_2 is inclosed in an insulated compartment having a copper lining. The methyl chloride is contained in a hermetically sealed copper tubing. This tubing forms a closed circuit with a condenser in the CO_2 chamber and an evaporator in the refrigerated compartment. Temperature control is obtained by a thermostatic valve in the methyl chloride circuit, this valve being actuated by the temperature in the refrigerated chamber.

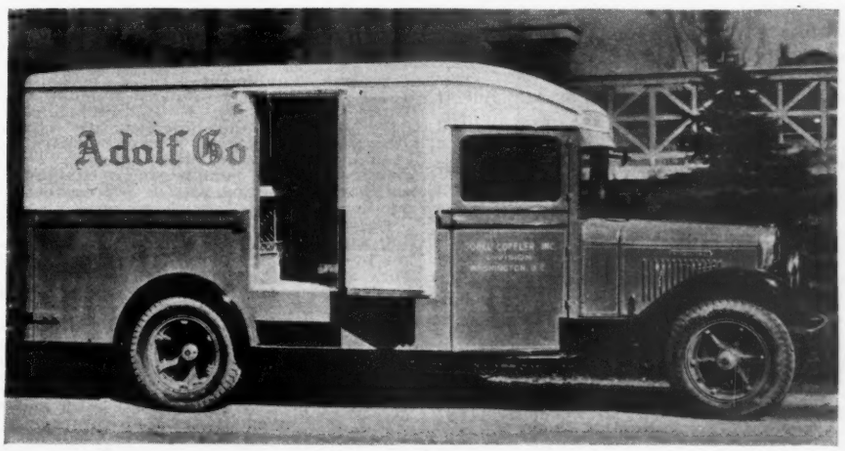
In operation, the solid CO_2 in the container produces a low pressure in the condensing unit of the methyl chloride circuit. The difference between that pressure and the pressure in the evaporating coil causes a flow of gas from the evaporator to the condenser. This produces a rapid evaporation of the liquid in the evaporator coil and consequent absorption of heat in the space surrounding it. The gas is then condensed by the low-temperature coil and returns by gravity to the evaporator coil.

The thermostatic valve may be adjusted for any temperature required within a 30-deg. range, units being available with their minimum temperatures varying from —30 deg. F. to +50 deg. F. The standard unit operates between —10 deg. F. and + 20 deg. F.

Thus, the truck may be refrigerated suitably for handling ice cream at a temperature consistent with the demand of the trade or for handling products, such as meat, which require a temperature of only 40 to 45 deg. F.

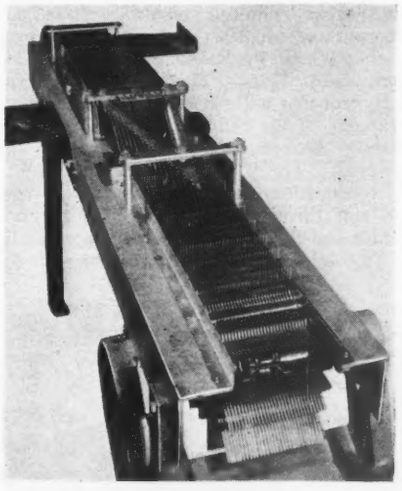


By using the two refrigerants in this manner, the disadvantages of strictly mechanical refrigerating units and of ice and salt mixtures are avoided. The operation of this system is not dependent upon the continuous running of the truck engine or the availability of an electric circuit. Nor does the truck operator have to contend with the excess moisture and the corroding action of the melted ice and salt, not to mention the heavy dead load that is imposed upon the truck chassis.



Fruit and Vegetable Slicer Makes Right-Angle Cuts

Fruits and vegetables may be cut into uniform, right-angle slices at a rate of 105 or more a minute by a slicing machine recently put on the market by The American Utensil Co., Chicago, Ill., the



manufacturers claim. The machine consists of a number of containers fastened to a chain that revolves on sprockets at each end of a frame. These containers are slotted to pass through a set of knives and are designed to hold any product of a size between that of the smallest and largest cucumbers. The slicing knives are held in a V-shaped frame which permits only part of the knives to cut into the product at any one time, preventing unnecessary bruising or breaking of the slices. To overcome any tendency for the product to tip when the first knife strikes it, the machine is

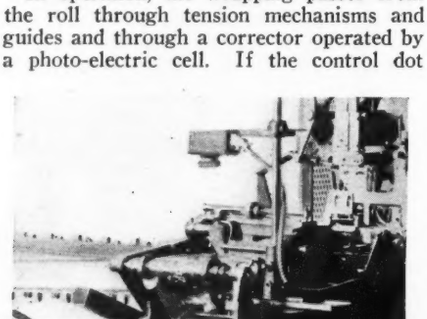
supplied with drags hung loosely from the frame which holds the knives. Before being run through the slicer, the products may be trimmed at the ends by knives attached to each side of the machine.

Stainless steel is used in all parts of the slicer which come in contact with the fruits or vegetables. The conveyor is driven by a ¾-hp. motor through a set of reduction gears. The unit is 7 ft. long, without the inspection table, which is 5 ft. in length; the slicer proper is 20 in. wide, but the side knives are 24 in. Slices ⅛ in. thick are cut by the standard machine, but machines can be built for thinner or thicker slicing.

Transparent Wrapping Adjusted by "Eye"

"Electric-eye" control of the position of the printing on packages wrapped in transparent cellulose materials has been incorporated in the design of wrapping machines built by Package Machinery Co., Springfield, Mass. This is the only type of control that will permit the use of printed wrappers of the cellulose type, since sheet-feeding devices will not work with the material.

In operation, the wrapping passes from the roll through tension mechanisms and guides and through a corrector operated by a photo-electric cell. If the control dot



on the wrapper is over the electric eye when the material stops for the knife to operate, the printing is in the proper position and no adjustment is made. But if the dot is ahead of the eye, so that light is admitted to it from the lamp on the opposite side of the wrapper, the corrector operates to reduce the length of the next wrapper. The control dot will either be over the photo-electric cell or ahead of it, as the wrappers are always cut a trifle long when the corrector does not work.

The illustration shows the roll of wrapping material and electric eye of a wrapping machine which operates at a speed of 80 packages per minute. Except for the photo-electric control, the machine is of standard construction. It occupies 11½x5 ft. of floor space and weighs 1,875 lb.

THE MANUFACTURERS OFFER

Ice Cans—Construction features and advantages of welded ice cans comprise the text of the effectively illustrated 8-page Bulletin 162-A of Frick Co., Waynesboro, Pa.

Conveyor Trolleys and Tracks—Some 30 applications of overhead trolley-type conveyors are given pictorially in a 20-page booklet of Richards-Wilcox Co., Aurora, Ill. Mechanical principles, capacities, sizes and price lists are included.

Arc Welding Equipment — Twenty-four pages are devoted to description of a complete line of equipment for arc welding, including price lists and discussions of weld characteristcs, in the bulletin, Section 3304, issued by Lincoln Electric Co., Cleveland, Ohio.

Rotary Pumps—A loose-leaf folder of the Viking Pump Co., Cedar Falls, Iowa, illustrates and gives the characteristics of different types of pumping equipment manufactured by the company for creameries, ice cream plants, food product factories and refrigeration plants.

Box Sealing Machine — The mechanical principles and advantages of the Tape-O-Matic box sealing machine made by Machine Parts Corp., 50-58 Columbia St., Newark, N. J., are given in an 8-page folder.

Milk Bottle Caps—Advantages and characteristics of the aluminum milk bottle caps and capping machines manufactured by Aluminum Seal Co., New Kensington, Pa., comprise the subject matter of an effectively illustrated 22-page booklet.

Cork Products—In a well-illustrated, 40-page booklet, Cork Insulation Co., Inc., 154 Nassau St., New York, N. Y., presents the uses, characteristics and typical installations of its product.

Formulas—A leaflet of Glyco Products Co., Inc., Bush Terminal Building No. 5, Brooklyn, N. Y., contains formulas for flavors, syrups, emulsions, jellies and jams, meringue and marshmallow, and foam and froth products.

Lecithin for Candy—The nature and advantages of Yelkin are described and a number of formulas for candies and jellies are given in a 20-page, pocket-size booklet of Ross & Rowe, Inc., 80 Broad St., New York, N. Y.

Food for Campers—The convenience of canned foods for campers, together with menus for the camper's three meals daily and a list of items that he should include in his food supply, are discussed in a folder leaflet, "Camping With Canned Foods," issued by National Canners' Association, Washington, D. C.

Truck Refrigeration — The controlled-temperature CO_2 refrigerator for truck bodies manufactured by York Ice Machinery Corp., York, Pa., is described and illustrated in a folder-leaflet.

Structural Panels—The method of construction, properties and typical installations are given for the metal-faced panels manufactured by Truscon Steel Co., Youngstown, Ohio, in a well-illustrated 20-page booklet.

Process Equipment — In a pocket-size folder leaflet, F. J. Stokes Machine Co., Tabor Road, Olney P. O., Philadelphia, Pa., illustrates and describes its dryers, extraction and solvent recovery apparatus, vacuum and water stills, mixers, autoclaves, tablet compressing equipment, vacuum pumps and special process equipment.

Dairy Thermometer—The universal-scale indicating thermometer placed on the market by C. J. Tagliabue Manufacturing Co., Park and Nostrand Aves., Brooklyn, N. Y., is described and illustrated in a folder leaflet.

Air Conditions and Labor—Proper temperature, humidity and air movement for industrial plants in summer and in winter and the measurement of physical properties of the atmosphere are subjects discussed in a 20-page booklet, Industrial Health Series No. 5, of Metropolitan Life Insurance Co., New York, N. Y.

Caps—An effective down view is an important factor in the sale of packaged goods, according to a folder of Anchor Cap & Closure Corp., 22 Queens St., Long Island City, N. Y., which treats of the subject pictorially.

Solid CO_2—Uses, advantages and characteristics of solid CO_2 are pointed out in an attractive leaflet of Michigan Alkali Co., 10 East 40th St., New York, N. Y. The new production and distribution facilities of the company also are mentioned.

Heaters—The specifications and rated output capacities of the all-aluminum and copper-core types of disk fan heaters of Niagara Blower Co., 6 East 45th St., New York, N. Y., are given in Bulletin No. 30.

Thrustors—Different applications of electric Thrustors are described and illustrated in a 22-page loose-leaf booklet of General Electric Co., Schenectady, N. Y.

Traveling Bakery Ovens—Points to consider in the selection of an oven, the advantages of the traveling oven, and several typical installations comprise the text of a 16-page, loose-leaf booklet of the Crawford Oven Co., New Haven, Conn.

Leather Belting—A folder leaflet of Mulhern Belting Co., 126 Chambers St., New York, N. Y., gives the characteristics and applications of different types of belting made by the company, together with a price list.

Plastic Compound—A 10-page, effectively illustrated pamphlet devoted to the effect of molded containers and caps on customer appeal and to the applications of Durez is offered by General Plastics, Inc., North Tonawanda, N. Y.

Motor Trucks—Descriptions, illustrations, and applications of the line of International Speed Trucks are included in an attractive 32-page booklet of the International Harvester Co., 606 South Michigan Ave., Chicago, Ill. The engine and other important parts of the chassis are described and illustrated separately.

Filling Machinery—The U. S. Bottle Machinery Co., 4015 North Rockwell St., Chicago, Ill., describes its filling machinery and equipment in an attractive, well-illustrated, 60-page booklet. Specifications and applications of the machinery are given.

Squirrel-Cage Motors — Seven types of squirrel-cage motors are described in loose-leaf Bulletin 174 of the Wagner Electric Corp., 6400 Plymouth Ave., St. Louis, Mo. The publication comprises 22 pages and contains illustrations, speed-torque curves, application tables, and construction details.

Cream Separators—The new series of De Laval factory-size separators, together with the applications and qualifications of the machines, is described and illustrated in an attractive 40-page booklet of the De Laval Separator Co., 165 Broadway, New York, N. Y.

Mechanical Stokers—A 32-page booklet comprised mainly of illustrations and blueprints, gives the features and applications of the equipment manufactured by the Detroit Stoker Co., Detroit, Mich. The company has also published a folder leaflet devoted to the food industries field exclusively.

Seamless Tubes and Pipe—A second edition of the Nirosta KA2 booklet of the Babcock & Wilcox Tube Co., Beaver Falls, Pa., now supplements the March, 1929, edition. Fifty-six pages of general information, test and operating data, curves, and illustrations comprise the publication.

Dairy Power Conveyors—Nine types of conveyors for handling everything in the dairy from bottles to egg cases are described and illustrated in the 28-page Bulletin No. 62 of the Mojonnier Brothers Co., 4601 West Ohio St., Chicago, Ill.

Laboratory Equipment—Kjeldahl nitrogen digestion and distillation apparatus is described and illustrated in a 4-page leaflet of the Laboratory Construction Co., 1113-1115 Holmes St., Kansas City, Mo. A similar leaflet by the company describes its laboratory electric heaters.

CONSTRUCTION NEWS

PROPOSED WORK BIDS ASKED

Baking Plant — Citizens Baking Co., C. N. Bargar, Pres., Jamestown, N. Y., will soon let contract for remodeling and equipping building at Sprague and Baker Sts. into baking plant.

Bakery—Giovanni Giattino, 339 East 106th St., New York, N. Y., is having plans prepared for alterations and additions to present 3 story plant, including reconstruction of foundations, storage, new bake oven, boiler room, etc. F. Burkhard, 640 Rosedale Ave., is architect.

Bakery—Keebler-Weyl Baking Co., 260 North 22nd St., Philadelphia, Pa., is having plans prepared for a bakery at Allegheny Ave. and Fox St. C. Wunder, Architects Bldg., Philadelphia, is architect.

Bakery—Kroger Grocery & Baking Co., A. S. Grogg, Gen. Mgr., 3801 Vista Ave., St. Louis, Mo., and 35 East 7th St., Cincinnati, O., is having revised plans prepared for a 4 story, 85 x 190 ft. and 1½ story, 43 x 63 ft. bakery and garage at 1311 South 39th St., St. Louis. Estimated cost $700,000. Emil E. Niemann, 3816 Shaw Ave., St. Louis, Archt.

Bakery and Storage—A. Streit, 152 Rivington St., New York, N. Y., plans converting a 6 story store and apartment into a 25 x 88 ft. storage and bakery. A. Fisher, 1431 Broadway, New York, is architect.

Bottling Plant—Try Me Bottling Works, 200 Fenchurch St., Norfolk, Va., plans reconstructing part of plant damaged by fire. Estimated cost $40,000 or less.

Brewery Addition—Fidelio Brewery Inc., 501 1st Ave., New York, N. S. Goldberger, in charge, plans alterations and addition to brewery, 1st Ave. and 29th and 30th Sts. Estimated cost is $400,000.

Canning Plant—Pea Ridge Canning Co., Pea Ridge, Ark., plans to reconstruct plant destroyed by fire.

Canning Plant—J. Weller Co., Oak Harbor, Mich., plans to build a canning plant at Clay, N. Y. Estimated cost to exceed $25,000.

Canning Machinery—Golden Head Canning Co., Ltd., Golden Head, B. C., will be in the market for canning machinery.

Dairy Exhibition Building — Century of Progress, Burnham Park, Chicago, Ill., plans construction of a dairy exhibition building. Estimated cost is $150,000.

Dairy Plant—Turtle Lake Creamery Co., F. Nieman, Treas., Turtle Lake, Wis., will receive bids for the construction of a 1 story, 60 x 110 ft. dairy plant. Estimated cost $40,000. E. F. Klinger, Amery, Wis., is architect.

Ice Cream Plant—Imperial Ice Cream Co., Tazewell, Va., plans the construction of an ice cream plant.

Flour Mill—F. O. Diver Milling Co., Middletown, O., plans to rebuild a part of flour mill recently damaged by fire at 809 Central Ave. Estimated cost about $40,000.

Flour Mill—Hetzel Co., Delavan, Wis., plans repairing flour mill recently damaged by fire. Estimated cost is $35,000.

Grain Elevator — Ashby Grain Elevator, Ladoga, Ind., plans the construction of a grain elevator. Estimated cost $40,000 or less. Maturity indefinite.

Grain Elevator, etc.—Memphis Bonded Warehouse Co., Inc., Ellis B. Anderson, Pres., 20 Adams Ave., Memphis, Tenn., are having preliminary plans prepared for the construction of a river and rail terminal including 1,000,000 bushel capacity grain elevator. Estimated cost $1,000,000.

Grain Elevator—Leinan, Sask.—Province Elevator Co., plans the construction of a grain elevator. Estimated cost $30,000.

Elevator and Feed Yards—Atchison, Topeka & Santa Fe Ry., Topeka, Kan., plans to rebuild 3 story grain storage elevator and feed yards recently destroyed by fire at Morris, about 4 mi. from Kansas City, with a loss of $50,000. Morris Feed Yards, c/o A. Hill, 925 Live Stock Exchange, Kansas City, Mo., lessee. Maturity indefinite.

Grist Mill—Pembroke Milling Co. Ltd., Pembroke, Ont., plans construction of a grist mill. Estimated cost is $40,000.

Dehydration Plant — Owner, c/o Frank E. Bowden, Fresno, Calif., plans construction of a dehydration plant at Farmersville. Estimated cost $50,000.

Fermentation Building — Standard Brands, Inc., 2655 19th St., is receiving bids for remodeling fermentation building at 2235 West 48th St. Estimated cost $40,000. W. C. Bennett, 326 West Madison St., Chicago, is architect.

Food Mart—Clark-Diversey Food Mart Inc., 2633 North Clark St., Chicago, Ill., plans the construction of a 100 x 116 ft. food mart. J. S. Stem, 7 S. Dearborn St., is architect. J. Lewis, 7 S. Dearborn St., designer.

Food Plant—Famous Foods, Ltd., Vancouver, B. C., Can., plans the construction of a 3 story, 50 x 122 ft. plant, machinery will be required.

Food Storage Building—Department of Public Works, T. S. Brindle, Supt., Columbus, O., will receive bids until July 18 for a 2 story, 64 x 150 ft. food storage and preparation building, at the University of Miami, Oxford, O. Garber & Woodward, 616 Walnut St., Cincinnati, are architects. Fosdick & Hilmer, Union Trust Bldg., Cincinnati, engineers.

Fruit Storage and Packing House — H. K. Davenport Warehouse Co., or lessees Sobel & Day Co. and Lafferty & Woods Storage Co., O'Dell, Ore., plan the reconstruction of a fruit storage and packing plant. Estimated cost $35,000.

Fruit Plant—Evaporated Fruits, Inc., Sunnyside, Wash., C. C. Ross, mgr., plans rebuilding manufacturing department, recently destroyed by fire. Estimated loss is $100,000.

Grocery Storage—Southern Wholesale Grocery Co., Chickasha, Okla., plans rebuilding storage and distribution facilities, recently damaged by fire. Estimated cost is $40,000.

Produce Storage Plant—Northwestern Fruit & Produce Co., 426 East 102nd St., New York, N. Y., will receive bids until about Sept. 1, for converting a garage and repair shop into a produce storage plant at 126 East 102nd St. R. Gottlieb, 4756 3rd Ave., New York, N. Y., is architect.

Cold Storage Plant—Grace Bros., 9th and Wilson Sts., Santa Rosa, Calif., plans to rebuild a cold storage plant recently destroyed by fire. Estimated cost exceeds $100,000.

Cold Storage Plant — Kelowna Grower Exchange, Vernon B. C., plans construction of a cold storage plant. Estimated cost is $34,000.

Ice Plant — Dri Ice Refrigeration & Service Co., c/o R. S. McGuire, 1533 Grand Ave., Kansas City, Mo., has taken an option on a site at 19th St., and Kansas Ave., and contemplates building a dry ice plant. Estimated cost $150,000.

Refrigeration Plant—H. Deile & Co., 84 Jackson St., Hoboken, N. J., taking bids for alterations to refrigeration plant including new refrigeration machinery, refrigerator doors, etc. at 84 Jackson St. Estimated cost $40,000. Construction Service Corp., 80 Broad St., Elizabeth, is architect.

Market Building and Refrigeration Plant—Daniel Kaufer, 113-10 Sutphin Blvd., Jamaica, N. Y., will receive bids about July 1 for a 1 story, 40 x 100 ft. market building, including refrigeration plant at 119th St. and Sutphin Blvd. L. Dananchen, 149-14 Jamaica Ave., Jamaica, is architect.

Packing Plant—Swift & Co. Packers and Exchange Aves., Chicago, Ill., having plans prepared for the construction of a 76 x 200 ft. packing plant at Water and Railway Sts. Estimated cost $40,000. Private plans.

Packing Plant—John Morell & Co., Ottumwa, Iowa, having plans prepared for the construction of a 2 story, 76 x 180 ft. meat packing plant at Kent Ave. and 10th St., Brooklyn, N. Y. Estimated cost $150,000. H. P. Henschien, 59 East Van Buren St., Chicago, Ill. is architect.

Packing Plant—Adolph Gobel, Inc., 40th St. and 11th Ave., New York, plans alterations to two 4 story buildings for packing plant at Morgan Ave. and Rock St., Brooklyn. O. S. Schlich, 136 Liberty St., New York, is engineer and architect.

Slaughter House—C. Lehmann Packing Co., Johnson Ave. and Bushwick Pl., Brooklyn, N. Y., is having plans prepared for alterations and additions to slaughter house. O. S. Schlich, 136 Liberty St., New York, is architect.

CONTRACTS AWARDED

Bakery Addition—Larson Baking Co., Henry and Mill Sts., Brooklyn, N. Y., awarded contract for construction of a 2 story addition to bakery to Caye Construction Co., 356 Fulton St., Brooklyn. Estimated cost $40,000.

Bakery — A. Shulman, 305 Broadway, New York, N. Y., awarded contract for the construction of a 2 story, 100 x 100 ft. bakery at White Plains and Brady Aves., to J. Baroncelli & Co., 2517 Radcliffe Ave., New York. Estimated cost $60,000.

Cannery—LaSalle Canneries, Inc., c/o J. Bayer Bell, Crystal City, Tex., awarded contract for a 1 story, 40 x 70 ft. vegetable cannery to J. J. Peters Co., Cotulla, Tex. Will install canning equipment now in use at Cotulla and may purchase additional machinery later.

Distribution Plant, etc.—Sheffield Farms Co. Inc., 524 West 57th St., New York, N. Y., awarded contract for a 2 story distribution plant, office, etc., at Hudson Blvd., Union City, N. J., to Deakman-Wells Co., 921 Bergen Ave., Jersey City, N. J. Estimated cost $100,000.

Flour Mill—Allied Mills, Inc., J. B. DeHaven, Vice Pres., Board of Trade Bldg., Chicago, Ill., awarded contract for the reconstruction of a flour mill recently destroyed by fire at 29th and B Sts., to Ryan Construction Company, Keeline Bldg., Omaha, Neb. Estimated loss $350,000.

Grain Elevator—Acme-Evans Co., 852 Washington Ave., Indianapolis, Ind., awarded contract for a grain elevator, consisting of twenty 40 x 80 ft. bins, 110 ft. high, 140,000 bu. capacity, to Wm. P. Jungclaus, 825 Massachusetts Ave., Indianapolis. Estimated cost $40,000.

Grain Elevator Addition — Aetna Mills, c/o Commander-Larabee Corp., Kansas City, Mo., awarded contract for 850,000 bu. addition to grain elevator at Wellington, Kan., to Jones-Hettelsater, 600 Mutual Building, Kansas City, Mo.

Grain Elevator—Universal Mills, Riverside St., Ft. Worth, Tex., awarded contract for the construction of a 272,000 bushel capacity grain elevator addition, Riverside St., to C. M. Davis, Cotton Exchange Bldg. Estimated cost is $40,000.

Cold Storage Plant—A. Fruh & Son, 810 Frelinghuysen Ave., Newark, N. J., awarded contract for alteration to cold storage plant to O. Joroff, 34 Prospect St., East Orange. Estimated cost $40,000.

Ice Plant—Park City Ice Co., 558 Howard Ave., Bridgeport, Conn., awarded contract for 2 story addition to plant on Howard Ave., to P. Frank, Inc., 1438 Main St., Bridgeport.

Ice Plant — Fischer & Co., 300 Iowa St., Dubuque, Ia., are expending between $150,000 nad $200,000 in changing over their artificial ice making plant from d.c. to a.c. and substitution for their own steam plant. Owner builds. Equipment contracts awarded.

Ice Plant—Ice Service Co., c/o W. P. Hill, Durent, Okla., will build a concrete and brick ice plant to have a capacity of 20 tons per day. Work will be done by owner's forces.

Grocery Warehouse—Kroger Grocery & Baking Co., 810 N. W. 4th St., Oklahoma City, Okla., awarded contract for 1 story, 100 x 160 ft. warehouse on 23rd St., to Austin Co., 510 North Dearborn St., Chicago, Ill. Estimated cost $125,000.

Storage Building — Trunz Pork Stores, 25 Lombard St., Brooklyn, N. Y., awarded contract for a 3 story, 60 x 78 ft. storage building at Lombard St. and Kingsland Ave., to Grove Improvement Co., 356 Fulton St., Brooklyn. Estimated cost $50,000.

Packing Plant—Hughes Provision Co., Wm. Hughes, Pres., 3199 West 65th St., Cleveland, O., awarded contract for a 2 story, 35 x 75 ft. addition to packing plant to Wm. Dunbar Co., 8201 Cedar Ave., Cleveland. Estimated cost $40,000.

Packing Plant — Val Decker Packing Co., Piqua, O., awarded contract for a 3 story, 112 x 160 ft. addition to packing plant to Green & Sawyer, Lima, O. Estimated cost $40,000.

Packing Plant—Swift & Co., Union Stock Yards, Chicago, Ill., awarded contract for a 2 story, 95 x 140 ft. adition to packing plant at Congress St. and Magnolia Ave. to G. A. Miller, 312½ Twiggs St., Tampa, Fla. Estimated cost $80,000.

Packing Plant—Corn Belt Packing Co., T. J. Riedel, Pres., Dubuque, Iowa, awarded contract for remodeling factory at 30th and Jackson Sts., to Anton Basten, 899 Rush St., Dubuque. Farmers Co-operative Produce Co., H. Christiansen, Mgr., 1568 Iowa St., lessee.

Slaughter House—A. Duer Pierce, Kennett Square, Pa., awarded contract for a 3 story slaughter house, to W. N. Worrall, 220 South Union St., Kennett Square. Refrigerator and slaughter house equipment will be installed.

Stockyards — Mississippi Valley Stockyards Co., H. Kiel, Pres., Ambassador Bldg., St. Louis, Mo., awarded contract for 2 story exchange building, sheep and hog yard buildings, cattle pens, etc., for stockyards on Angelica and Penrose Sts., to Boaz-Kiel Construction Co., 411 North 7th St., St. Louis. Estimated cost $85,000.

PATENT DIGEST

Baking and Milling

Methods and Means of Packaging Ready-to-Bake Biscuits—Lively B. Willoughby to Ballard & Ballard Co., Louisville, Ky. Reissue No. 18,426 of original U. S. patent No. 1,811,772. April 19, 1932.

Process of Preparing Food Products From Yeast by Heating With a Mixture of Hydrochloric, Lactic and Phosphoric Acids — Charles N. Frey and Elmer B. Brown, New York, N. Y., and Colgate Craig, Peekskill, N. Y., to Standard Brands, Inc., Dover, Del. No. 1,854,929. April 19, 1932.

Process of Producing Food Products From Yeast by Heating With a 3 to 1 Mixture of Hydrochloric and Lactic Acids—Charles N. Frey and Elmer B. Brown, New York, N. Y., and Colgate Craig, Peekskill, N. Y., to Standard Brands, Inc., Dover, Del. No. 1,854,930. April 19, 1932.

Grain, Flour, and Milling Products Treated With Halogenated Amine—Gerrit van Der Lee to Naamlooze Vennootschap Internationale Oxygenium Maatschappij Novadel, Deventer, Netherlands. No. 1,855,158. April 19, 1932.

Method of Making a Pastry Article Having a Multi-Layered Top and Bottom Crust—Samuel Chalikian, New York, N. Y. No. 1,853,037. April 12, 1932.

Confectionery

Non-Thickening Syrup From Cocoa Produced by Amylolytic and Proteolytic Enzymes Action—Max Wallerstein to Wallerstein Co., Inc., New York, N. Y. Nos. 1,854,353-5 inclusive. April 19, 1932.

Cocoa Beans Roasted by Flow Through Vertical Tubes, Countercurrent to Heated Air—Dale G. Steeley, Arlington, Mass., and Frederick W. Blake, Medford, Mass., to Dale G. Steeley. No. 1,854,429. April 19, 1932.

Candy Made From Honey, Lactose, Cream or Cocoa Butter and Evaporated Milk—Nellie Jean Stratton to the Honey Candy Co. of America, Youngstown, Ohio. No. 1,854,430. April 19, 1932.

Chewing Gum Base From Chlorparaffin Resin and Depolymerized Rubber—Leon W. Geller, Syracuse, N. Y., to American Chicle Co., Long Island City, N. Y. No. 1,855,016. April 19, 1932.

Chewing Gum Base Composed of Fats, Fatty Acids, Chlorparaffin Resin and Rubber—Leon W. Geller, Syracuse, N. Y., to American Chicle Co., Long Island City, N. Y. No. 1,855,017. April 19, 1932.

Dairy and Egg Products

Method of Stabilizing Albuminous Content of Concentrated Milk to Prevent Heat Coagulation and Calcium Salt Precipitation—George Grindrod, Oconomowoc, Wis., to the Grindrod Process Corp., Waukesha, Wis. No. 1,854,189. April 19, 1932.

Apparatus With at Least Three Concentric Tubes of Different Diameters for Treating Milk—Cornelius Mortensen, Louisville, Ky. No. 1,854,619. April 19, 1932.

Honey and Butter Homogenized to Form a Free-Flowing Syrup—Michael J. Bridgman, Jerome, Idaho. No. 1,856,206. May 3, 1932.

Means for Branding Grade on Cheese—John F. Barghausen, Washington, D. C., to the government and the people of the United States of America. No. 1,856,530. May 3, 1932.

Eggs Sterilized and Preserved by Emulsifying the Broken Egg Mass With a Carbohydrate and Subsequently Separating Fibrous Portions — Joseph Fousek, San Francisco, Calif. No. 1,852,606. April 5, 1932.

Drum-type Machine for Manufacture of Dry Milk—Glen Overton, Kalamazoo, Mich. No. 1,853,451. April 12, 1932.

General Equipment

Two-Level Compartmented Soaking and Bottle Cleaning Machine—George J. Meyer, Milwaukee, Wis., and George L. N. Meyer, Jackson Heights, N. Y., to the George J. Meyer Manufacturing Co., Cudahy, Wis. No. 1,853,917. April 12, 1932.

Lever-Pressure Feed Attachment for Food Choppers — Adolph Rubin to Hussmann-Ligonier Co., St. Louis, Mo. No. 1,854,227. April 19, 1932.

Refrigerator Display Case for Perishable Foodstuffs—Clement D. Hill to C. D. Hill & Co., Inc., Trenton, N. J. No. 1,857,545. May 10, 1932.

Meat Packing

Rotary Feed Drum Cutting Machine for Splitting Animal Intestines — Gustav Redemske to Armour & Co., Chicago, Ill. No. 1,854,426. April 19, 1932.

Units Having Upper and Lower Expansion Chamber With Compartment Between for Freezing Foodstuffs—James J. Barry, Dartmouth, N. S., to Maritime Fish Corp., Ltd., Montreal, Quebec. No. 1,855,467. April 26, 1932.

Methods and Means for Branding Trademark on Meat—Henry H. McKee to Swift & Co., Chicago, Ill. Nos. 1,855,919 and 1,855,920. April 26, 1932.

Device for Ink-Branding Meats—Archie L. Scott and Gustave Schuler to Swift & Co., Chicago, Ill. No. 1,855,927. April 26, 1932.

Pork Skinning Machine — William H. O'Connor, Newark, N. J. No. 1,852,187. April 5, 1932.

Hollow Reamer-Type Mechanism for Cleaning and Washing Out Inside of Fish—Burt C. Youman to California Packing Corp., San Francisco, Calif. No. 1,853,328. April 12, 1932.

Grid-Like Meat Rack for Refrigerator Cars—Arnold E. Dentler to W. H. Miner, Inc., Chicago, Ill. No. 1,856,472. May 3, 1932.

Miscellaneous Products

Coffee Treated With Citric Acid, Mixed With Cocoa or Chocolate, and Roasted—David Joseph Kennedy, Vancouver, B. C., Canada. No. 1,853,278. April 12, 1932.

Tea Syrup for Beverage Flavoring—Paul D. Potter and Raymond T. Metzger, Winnetka, Ill., to Sprague, Warner & Co., Chicago, Ill. No. 1,854,062. April 12, 1932.

Alimentary Products Formed by Rotor-Compressor Type Machine and Discharged by Means of Air-Pressure Action—Herbert T. Hunter, Baltimore, Md., to Doughnut Machine Corp., New York, N. Y. No. 1,854,148. April 12, 1932.

Copies of Patents

Complete specifications of any United States patent may be obtained by remitting 10c. to the Commissioner of Patents, Washington, D. C.

Photostatic copies of foreign patents may be obtained at the same address, prices being forwarded on application.

Copies of patents should be ordered by number, as titles used in this digest seldom correspond with title of patent.

THE GOVERNMENT PUBLISHES

DOCUMENTS ARE AVAILABLE *at prices indicated from Superintendent of Documents, Government Printing Office, Washington, D. C. Send cash or money order; stamps and personal checks not accepted. When no price is indicated, pamphlet is free and should be ordered from bureau responsible for its issue.*

Confectionery Distribution, by Edmund A. Flagg. Bureau of Foreign and Domestic Commerce, Foodstuffs Division; mimeographed. Preliminary annual report of confectionery distribution 1930-1931.

Small Plants for Pasteurizing Milk, by Fred M. Grant and C. E. Clement. Department of Agriculture, Circular 214; 5 cents.

Milk Refrigeration and Handling, by John T. Bowen. Department of Agriculture, Miscellaneous Publication 138; 10 cents. Refrigeration in the handling, processing, and storing of milk and milk products.

Lemon and Orange Oils, by H. D. Poore. Department of Agriculture, Technical Bulletin 241; 5 cents. Analyses and composition of California lemon and orange oils.

Soybean Utilization, by W. J. Morse, Sr. Department of Agriculture, Farmers' Bulletin 1617; 5 cents.

Organic Acids From Carbohydrates, by O. E. May and H. T. Herrick. Department of Agriculture, Circular 216. A digest of the literature on production of organic acids from carbohydrates by fermentation.

Factors Affecting the Price of Rice, by Carlos E. Campbell. Department of Agriculture, Technical Bulletin 297; 5 cents.

Market Diseases of Potatoes, by George K. K. Link and Glen B. Ramsey. Department of Agriculture, Miscellaneous Publication 98; 30 cents. This document is available by purchase only.

Market Diseases of Tomatoes, Peppers and Eggplants, by Glen B. Ramsey and George K. K. Link. Department of Agriculture, Miscellaneous Publication 121; 20 cents. This document is available by purchase only.

Barley Smut Control by Dust Fungicides, by R. W. Leukel. Department of Agriculture, Technical Bulletin 293; 5 cents. Factors affecting the development of loose smut in barley and its control by dust fungicides.

Hydrocyanic Acid Gas as a Fumigant for Destroying Household Insects, by E. A. Back and R. T. Cotton. Department of Agriculture, Farmers' Bulletin No. 1670; 5 cents.

Seed-Treatment Experiments With Yellow Dent Corn, by James R. Holbert and Benjamin Koehler. Department of Agriculture, Technical Bulletin No. 260; 20 cents.

Pork on the Farm, by K. F. Warner. Department of Agriculture, Farmers' Bulletin 1186; 10 cents. Killing, curing, and canning pork.

Dairy Cattle Breeds, by Amer B. Nystrom. Department of Agriculture, Farmers' Bulletin 1443; 5 cents.

Yearbook of Agriculture, 1932, edited by Milton S. Eisenhower. Department of Agriculture, unnumbered publication; $1.

Handbook of Labor Statistics, 1931 Edition. U. S. Department of Labor, Bureau of Labor Statistics, Bulletin No. 541; $1.25.

Glassine Bags. Bureau of Standards, Simplified Practice Recommendation R107-31; 5 cents.

One-Pound Folding Boxes for Coffee. Bureau of Standards, Simplified Practice Recommendation R64-30; 5 cents.

Optical Rotation of Liquids, by T. Martin Lowry. Bureau of Standards Miscellaneous Publication 118. The optical rotation of liquids, its variation with wave length, temperature, solvent and concentration.

Commercial Survey of Pacific Northwest, by Edwin Bates. Bureau of Foreign and Domestic Commerce, Domestic Commerce Series No. 51; $1.

Establishing Industrial Sales Territories, by G. R. Salisbury. Bureau of Foreign and Domestic Commerce, Domestic Commerce Series No. 60; 10 cents.

International Marketing of Surplus Wheat, by George J. Carr. Bureau of Foreign and Domestic Commerce, Trade Promotion Series 130; 5 cents.

Grains and Grain Products in Europe, by Roberta P. Wakefield. Bureau of Foreign and Domestic Commerce, Trade Promotion Series 131; 50 cents. Part V of the handbook of foreign tariffs and import regulations on agricultural products.